Elm Street Groundwater Contamination Superfund Site

ID: INN 000 509 938

Terre Haute, Vigo County, Indiana

Record of Decision

U.S. Environmental Protection Agency Region 5

77 W Jackson Blvd
Chicago, IL 60604

September 2017

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LIST OF ACRONYMS AND ABBREVIATIONS

AQD	Air Quality Division
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
BERA	Baseline Ecological Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
COC	Contaminant of Concern
COPC	Chemicals of Potential Concern
COPEC	Chemicals of Potential Ecological Concern
COI	Chemicals of Interest
CSM	Conceptual Site Model
DCA	Dichloroethane
DCE	Dichloroethene
DO	Dissolved Oxygen
EA	Exposure Area
EPA	U.S. Environmental Protection Agency
ELCR	Excess lifetime cancer risk
ERA	Ecological Risk Assessment
ERD	Enhanced Reductive Dechlorination
ESI	Expanded Site Inspection
ESL	Ecological Screening Level
ESV	Ecological Screening Value
FS	Feasibility Study
GAC	Granulated Activated Carbon
HHRA	Human Health Risk Assessment
HHSL	Human Health Screening Level
HI	Hazard index
HQ	Hazard quotient
IC	Institutional control
IAWC	Indiana American Water Company
IDEM	Indiana Department of Environmental Management
ISCO	In-situ Chemical Oxidation
ISCR	In-situ Chemical Reduction
ISU	Indiana State University
MCL	Maximum Contaminant Level
MDEQ	Michigan Department of Environmental Quality
MNA	Monitored Natural Attenuation
MTG	Media to Groundwater
MTS	Machine Tool Service
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ND	Non-detect

LIST OF ACRONYMS AND ABBREVIATIONS, CONT'D

NOD	Natural Oxidant Demand
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
ORP	Oxidation-Reduction Potential
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCA	Tetrachloroethane
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RG	Remedial Goal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RISC	Risk Integrated System Closure
ROD	Record of Decision
ROI	Radius of Influence
RSL	Regional Screening Level
R/T	Release/Transport
SI	Site Investigation
SLERA	Screening Level Ecological Risk Assessment
SSI	Screening Site Investigation
SVE	Soil Vapor Extraction
SVOC	Semi-volatile Organic Compound
TCA	Trichloroethane
TCE	Trichloroethene
TCR	Total Cancer Risk
U.S.C.	United States Code
UST	Underground Storage Tank
UU/UE	Unlimited Use/Unlimited Exposure
VAS	Vertical Aquifer Sample
VOC	Volatile Organic Compound
ZVI	Zero Valent Iron

Part 1 – Declaration

1.1 Site Name and Location

Elm Street Groundwater Contamination
Terre Haute, Vigo County, Indiana
CERCLIS ID: INN 000 509 938

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the Elm Street Groundwater Contamination ("site" or "Elm Street site") Superfund site in Terre Haute, Vigo County, Indiana. The U.S. Environmental Protection Agency (EPA) chose the Selected Remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. § 9601 *et seq.* and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision is based on the Administrative Record file (see Appendix 1) for the Elm Street site.

The State of Indiana (Indiana Department of Environmental Management (IDEM)) has concurred with the selected remedy. EPA will place the State's concurrence letter (see Appendix 2) into the site Administrative Record.

1.3 Assessment of Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of Selected Remedy

The Selected Remedy for the Elm Street site is a combination of Alternative S-3: Soil Vapor Extraction (SVE), Soil Excavation with Off-site Disposal, and Institutional Controls and, as an interim measure, Alternative GW-2: Groundwater Monitoring and Institutional Controls. It is estimated to cost \$3.8 million and will take about one (1) year to build the SVE system and complete the soil excavations, establish the groundwater monitoring well network, and implement required institutional controls (ICs).

Alternative S-3 will address the site-related contaminants in site soil by:

- Excavating shallow, accessible contaminated soil (not located under a building foundation) containing volatile organic compounds (VOCs), arsenic, polycyclic aromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs) for off-site disposal;
- Installing and operating a SVE system at locations where VOCs are present in subsurface soil at depths that would make excavation unfeasible; and

- Recording ICs on properties where SVE is to be installed to prevent interference with the remedy components.

Alternative GW-2, as an interim remedial measure, requires that groundwater monitoring be performed until remediation goals are met in the groundwater and to also demonstrate the effectiveness of the soil remedy. ICs will be recorded to prevent use of groundwater for drinking until cleanup goals are met.

EPA intends that this ROD be the final decision document for the soil contamination at the Elm Street site. A final decision document will be needed to address the site's groundwater since this ROD is addressing groundwater as an interim measure. The selected remedial actions will remove contaminated soil for off-site disposal and treat the deeper VOC-contaminated soil to reduce contaminants leaching to the groundwater. Groundwater monitoring will be performed as an interim measure until it can determine whether remediation goals can be met and to monitor the effectiveness of the soil remedy in meeting the goals for groundwater. Although EPA found potential soil vapor intrusion (VI) issues at the Gurman and Ashland properties, the Agency is not selecting a remedy to address VI because the Gurman facility is currently operating and may be handling or using VOCs during their operations; the Ashland facility has had its buildings razed. EPA will, however, revisit the VI issue at Gurman and Ashland if the land uses change before the cleanup levels are reached. (See Section 2.8 of this ROD for more detailed discussion on this issue.)

EPA did not identify any principal threat waste at the site.

1.5 Statutory Determinations

The Selected Remedy is protective of human health, complies with federal and state requirements that are applicable or relevant and appropriate (ARAR) to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. The remedy satisfies the statutory preference for treatment as a principal element of the remedy.

EPA will conduct Five Year Reviews (FYRs) at the Elm Street site until the soil and groundwater remedial goals (RGs) have been met. The remedy will remove accessible contaminated soil off-site and will treat subsurface soil containing VOCs. A final groundwater remedy will be put in place after data has been collected to determine if monitored natural attenuation is a viable remedy or if another alternative is determined to be the final remedy for the site. Groundwater monitoring will continue until the RGs have been met. Once the RGs have been achieved, EPA would consider classifying the site for unlimited use/unlimited exposure (UU/UE). If, at that time, the remedy is protective of human health, the site may be deleted from the National Priorities List (NPL), and EPA may cease conducting FYRs.

1.6 Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for this site.

Information Item	Section in Record of Decision
Chemicals of concern and their respective concentrations	2.2 and 2.5
Baseline risk represented by the chemicals of concern	2.2 and 2.7
Cleanup levels established for chemicals of concern and the basis for these levels	2.8
How source materials constituting principal threats are addressed	2.11
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater use in the baseline risk assessment and the ROD	2.6
Potential land use that will be available at the site as a result of the Selected Remedy	2.6
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	2.9
Key factor(s) that led to selecting the remedy (that is, describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision)	2.10, 2.12, and 2.13

1.7 Authorizing Signature

Margaret M. Guerriero, Acting Director
Superfund Division
U.S. EPA - Region 5

9/26/2017
Date

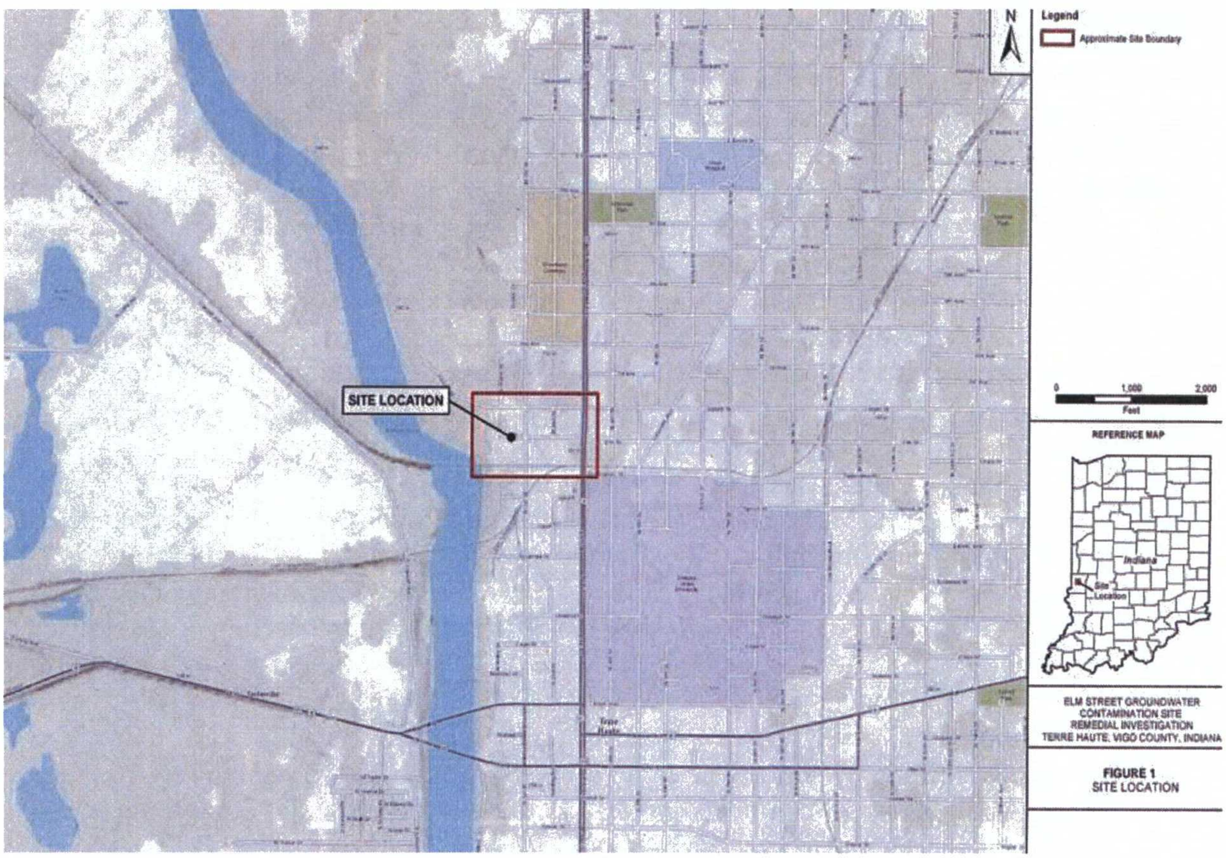
Part 2 – Decision Summary

2.1 Site Name, Location, and Brief Description

The Elm Street Groundwater Contamination Superfund site (CERCLIS ID# INN 000 509 938) is located in the city of Terre Haute in Vigo County, Indiana (see Figure 1). EPA placed the Elm Street site on the NPL in March 2007 and is the lead agency for the site. IDEM is the support agency. All site investigative work to date has been fund-financed.

The Elm Street site is roughly bounded by Locust Street to the north, North 3rd Street (U.S. Highway 41) to the east, railroad tracks to the south, and the Wabash River to the west (see Figure 2). The area surrounding the site includes an apartment complex and open/recreational land to the north, commercial and residential property to the east and south, and the Indiana American Water Company (IAWC) and the Wabash River to the west.

Figure 1: Site Map



IAWC operates Terre Haute's municipal water system, which consists of several municipal wells and a radial collector well located adjacent to the site. The municipal wells are installed in the deep portion of a surficial sand and gravel aquifer along the east bank of the Wabash River. Since the 1980s, these wells have shown detectable levels of VOCs-including tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA), and 1,2-dichloroethene (DCE). The levels of VOCs in the municipal wells have not exceeded federal and state drinking water standards in water delivered to customers. The radial collector well draws from deep riverine deposits about 1,200 feet west-northwest of the site and is now the primary source of drinking water. No VOCs have been detected in this water.

Three potential source areas for VOCs were identified by IDEM through the site assessment process. The potential source areas include the Gurman property located at 800 North 3rd Street, the Ashland (formerly BiState Products) property located at 118 Elm Street, and the Machine Tool Service (MTS) property located at 117 Elm Street. For purposes of the remedial investigation, EPA divided the MTS property into three sub-properties: MTS, North 2nd Street, and Sinclair. Brief descriptions and histories of these areas appear below.

2.2 Site History and Enforcement Activities

Site History

The Gurman facility has been in operation since 1922. The northern one-third of the facility was in residential use prior to the early 1980s. From 1930 to 1980, Gurman mainly reconditioned and sold steel barrels. Since 1980, Gurman primarily has sold paper and plastic containers and reconditioned customer-owned drums. It is believed that Gurman accepted drums containing various types and likely small quantities of product or waste material. The standard practice for most of its operational history from the 1950s to the 1980s was to open the drums and dump their contents onto the ground surface, and then rinse the remaining contents into a local storm sewer prior to refurbishing. During the screening site inspection (SSI) in 1987, IDEM noted that about 1,000 drums were at the Gurman facility.

The Ashland facility served as a local supplier of Texaco products from the 1930s through the 1980s. Petroleum products were stored in bulk and distributed, and solvents were used for parts cleaning at local service stations. In 1980, MTS purchased the property and leased it to BiState, which operated the facility for satellite collection and storage of waste oils. In the late 1980s, the property was purchased by Consolidated Recycling for petroleum recycling. In the early 1990s, the property was transferred to Valvoline Oil Company (Valvoline). From 1990 through 1998, the property was owned and operated by First Recovery, a former division of Valvoline. In 1999, many Valvoline recycling facilities were transferred to Safety Kleen; however, Ashland stated that in 1999, Safety Kleen did not take possession of the facility, but did remove some real property in early 2000. In addition, two underground storage tanks (UST) were removed near the warehouse area in 1986 and 1988. The used oil storage operations that followed may have accepted oils containing solvents; however, the presence of the chlorinated VOCs in the raw municipal water predates the oil recycling operations. Ashland notified

EPA on July 25, 2016 that it planned to separate into two independent, publicly-traded companies with Ashland focusing on specialty chemicals and Valvoline focusing on high-performance lubricants. Future obligations at the Ashland facility in Terre Haute were transferred to Valvoline LLC on August 1, 2016. For consistency, this facility will be referred to as Ashland.

The MTS facility stored petroleum products and solvents on the eastern portion of its property. A review of historical area maps showed that a former locomotive repair and maintenance facility (roundhouse) was previously located on the eastern side of the property. Two maps (dated 1858 and 1874) depicted the roundhouse as sited between 2nd and 3rd Street and south of Elm Street on the parcel currently identified as the former Sinclair facility. Although no evidence exists to substantiate the use of solvents during locomotive repair operations at the roundhouse, the use of solvents is considered common practice during the late 1800s through the mid-1900s.

In the early 1980s, IAWC began seeing chlorinated VOCs in the deep wells during required monitoring of the wellfield and notified IDEM. IDEM began the site discovery process for the Elm Street site in 1987, based on information submitted by IAWC.

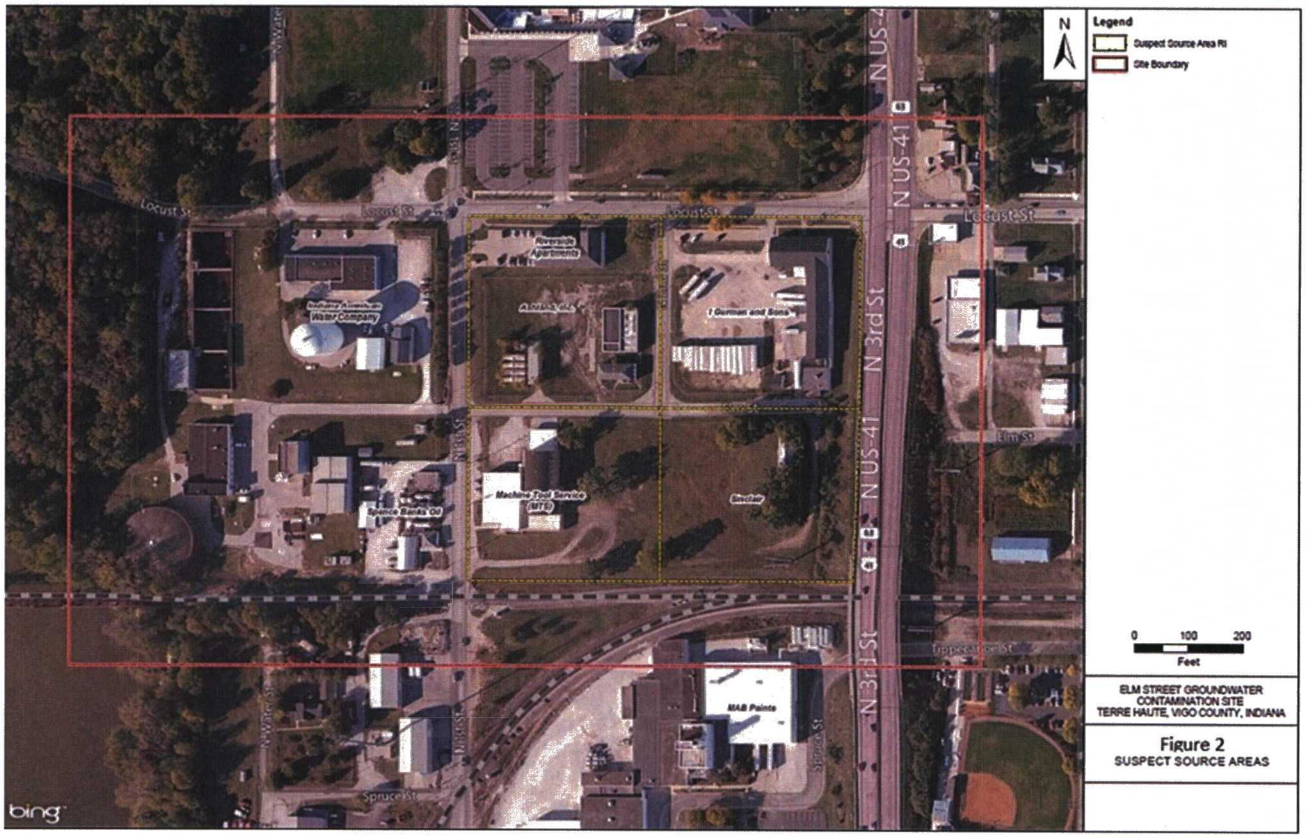
History of Remedial Activities

In 1988 and 1989, IDEM conducted site investigations (SI) at the Gurman, Ashland, and MTS facilities because they were suspected to be potential sources of contamination to groundwater (see Figure 2 for suspected source areas). IDEM collected surface and near-surface soil samples during the SIs. A near-surface soil sample (about 1 foot below ground surface (bgs)) near the Gurman reconditioning building contained PCE, TCE, trans-1,2-DCE, 1,1,1-TCA, and 1,1-DCA. One near surface soil sample collected at the southeast portion of the Ashland facility contained TCE, and another soil sample collected at about 30 inches bgs in the northeast portion of the Ashland property contained toluene, 1,2-DCE, and xylene.

In 1999, IDEM conducted an expanded site investigation (ESI) at the three facilities. During the ESI, IDEM drilled 12 soil borings and collected soil samples at each facility and installed and sampled 22 groundwater monitoring wells (consisting of a shallow and deep well pair at a total of 11 locations). IDEM conducted follow-up sampling of the 22 groundwater monitoring wells in 2000. Analytical results of the IDEM soil and groundwater samples indicated that some of the chemicals detected in the municipal well water were also detected in soil and groundwater beneath the three facilities.

In 1990, Valvoline conducted a limited geotechnical exploration and preliminary petroleum hydrocarbon study as part of a proposed property acquisition of the Ashland facility. Valvoline drilled four test borings and detected slight to moderate petroleum odors in soil samples recovered during the drilling, with low concentrations of VOCs detected using a photoionization detector. Two soil samples were submitted for laboratory analysis for benzene, toluene, xylene, and total petroleum hydrocarbons. Soil boring logs and a location map were included in the subsequent report but laboratory analytical data for the two soil samples were not attached.

Figure 2: Site Suspected Source Areas



In September 2005, Ashland conducted a modified Phase I/Phase II investigation at 118 Elm Street. As part of the investigation, Ashland installed four temporary shallow groundwater monitoring points and collected groundwater samples from each point, as well as from seven monitoring wells installed by IDEM during the ESI. PCE was detected above its maximum contaminant level (MCL) at one existing shallow monitoring well and at two of the temporary monitoring points on the Ashland facility. PCE was also detected above its MCL at an existing shallow monitoring well located east (upgradient) near the western edge of the Gurman facility. In addition, soil samples were collected at each of the four shallow points as they were advanced. No chlorinated VOCs were found in any of the soil samples. Several non-chlorinated organic compounds (including acetone, toluene, cyclohexane, and methyl cyclohexane) were detected at concentrations less than their respective IDEM Risk Integrated System of Closure (RISC) default closure levels for residential exposure near the southeast corner of the office building and near the location of a former underground storage tank (UST).

In the summer of 2013, Ashland conducted voluntary pre-demolition asbestos abatement, building demolition, and excavation of contaminated soil at 118 Elm Street. Buildings and structures demolished included aboveground storage tank (AST) bulk storage tanks, a concrete containment structure, and small warehouse adjacent to the containment area on the western portion of the property. A warehouse located on the eastern portion and a house/office on the southeast corner of the property were also demolished. Building materials were disposed off-site at a landfill. In addition to building demolition, an inactive railroad spur and seven subsurface pipes were disposed of off-site. Fluids remaining in the pipes were recovered and drummed for disposal. Soil from minor spilling during removal was excavated and stockpiled for characterization and disposal. Over 200 tons of soil was excavated as follows:

- About 62 tons of surface soil and shallow subsurface soil was excavated in the footprint of the warehouse building to a total depth of 2 feet below ground surface (bgs);
- About 44 tons of surface and shallow subsurface soil was excavated outside the southwestern corner of the warehouse building footprint to an average depth of 4 feet bgs to remove soil contaminated with PCE;
- About 79 tons of surface and shallow subsurface soil was excavated west of the former warehouse building footprint to the average depth of 4 feet bgs to remove PCE-contaminated soil; and
- About 26 tons of subsurface and shallow subsurface soil was excavated southwest of the former warehouse building footprint to an average depth of 4 feet bgs to remove soil contaminated by benzene, toluene, ethylbenzene, and xylene.

A subsequent subsurface investigation was done after the voluntary removal action was completed. Analytical results indicated that VOC and SVOC soil contamination was still present at the site at concentrations exceeding the IDEM Migration to Groundwater (MTG) and EPA soil regional screening levels (RSLs). In addition, groundwater samples at the site resulted in concentrations exceeding the maximum contaminant level (MCL) for PCE.

Enforcement Activities

From about 2003 to 2006, EPA issued a series of Information Requests, General Notice Letters, and Special Notice Letters to Ashland, Gurman, and MTS requesting information regarding their operations. Various correspondences were submitted to EPA by each of the parties in response to the information requests.

On September 9, 2006, EPA proposed the Elm Street Groundwater Contamination site for inclusion on the NPL. All potentially responsible parties (PRPs) subsequently declined to participate in an Administrative Settlement and Order on Consent for Remedial Investigation and Feasibility Study (RI/FS) proposed by EPA. In June 2008, EPA began a fund-lead RI/FS at the Elm Street site.

2.3 Community Participation Activities

EPA made the Proposed Plan and other relevant and supporting documents for the Elm Street site, including the RI and FS Reports, available to the public in August 2017. Copies of all the documents supporting the remedy outlined in the Proposed Plan and contained in the Administrative Record file were made available to the public at the Vigo County Public Library, where an information repository has been set up. A notice of the availability of these documents was published on August 6, 2017 in *The Tribune Star,* a newspaper covering the Terre Haute area. A 30-day public comment period on the Proposed Plan was held from August 7 to September 6, 2017. EPA indicated that it would accept public comments via mail, email, and electronic submissions through its website. EPA's responses to the comments received during the public comment period are provided in the Responsiveness Summary (see Part 3) of this ROD.

2.4 Scope and Role of Operable Unit or Response Action

EPA is addressing the Elm Street site as a single operable unit. This ROD calls for cleanup of all site-related contamination in soil and is intended to be the final response action for this media. A future decision document will be developed to be the final response for groundwater. Although VI is not specifically addressed at the Ashland and Gurman facilities, EPA will revisit the VI issue if the current land uses change before the soil and groundwater remediation goals are reached.

2.5 Site Characteristics

Regional Setting

Vigo County is located in west-central Indiana and is bordered by Vermillion County and Parke County to the north, by Clay County to the east, by Sullivan County to the south, and by the Illinois state line to the west. Its population is about 108,000, based on the most recent census (2010). Terre Haute is its largest city. County-wide land use is mostly rural agricultural with scattered small towns or villages and state-designed recreational and wildlife areas.

Weatherbase.com reports an average annual temperature of approximately 53.1 degrees Fahrenheit for the city of Terre Haute and states that precipitation averages about 41.4 inches per year.

Elm Street Site Setting

The Elm Street site is located in a commercial/industrial area and is comprised of several different properties. The Gurman property encompasses 2.5 acres and is bounded to the north by Locust Street, east by U.S. Highway 41, south by Elm Street, and the west by 2nd Street. The property has several buildings. A concrete parking lot exists on the northern portion of the property along Locust Street. The property is also fenced. Trailers and drums are stored on gravel. The property is currently an active drum recycling facility that accepts used drums for reconditioning and then sells them.

The Ashland property is 1.5 acres and is bounded to the north by the Riverside Apartments, on the east by 2nd Street, on the south by Elm Street, and on the west by 1st Street. As noted above, Ashland demolished facility buildings and excavated contaminated soil in 2013. The Ashland facility is fenced.

The MTS property covers 2.5 acres and is bounded to the north by Elm Street, on the east by the former Sinclair property, on the south by the CSX railroad, and on the west by 1st Street. Several interconnected buildings and a parking lot are present. MTS is currently an active machine tool repair business.

The former Sinclair/roundhouse property is owned by MTS. The property encompasses 2.5 acres of property bounded to the north by Elm Street, on the east by the U.S. 41 overpass, on the south by the CSX railroad, and on the west by the MTS property. Parcels in this area are also owned by the City of Terre Haute. This property is unsecured.

Other properties near the Elm Street site include the Riverside Apartments north of the Ashland property, residential properties across U.S. 41, IAWC to the west, and Spence Oil. Indiana State University owns sport facilities north of the site and the CSX railroad line runs south of the site.

The Wabash River flows west of IAWC, but does not appear to serve as a significant recreational area for swimming or fishing activities, based on site observations.

Regional Geology

The site is located in the physiographic region called the Wabash Lowland. This physiographic region averages about 500 feet above sea level and is more than 350 feet lower in elevation than the crest of the Crawford Upland. Relatively nonresistant siltstone and shale of Pennsylvania age is the dominant rock type. In places, a thin layer of glacial materials blankets the bedrock, but the glacial tills are too thin to have a noticeable effect on the land forms. Rocks that outcrop in the southwestern corner of Indiana comprise the McLeansboro Group. This group can be as thick as 770 feet and consists of mostly sandstone and shale with discontinuous beds of coal and limestone throughout the sequence. Bedrock underlying the area is composed of primarily sandstone and shale, with thin, but laterally persistent beds of limestone and coal. Unconsolidated deposits of glacial and fluvial origin overlie the bedrock surface throughout most of the area.

Elm Street Site Geology, Topography, and Hydrology

In the area of the Elm Street site, surface and near subsurface conditions generally include silty fine sand with trace clay, fine to coarse gravel, and organic matter fill. Subsurface soils are predominantly very loose to dense silty fine to coarse sand with varied amounts of fine to coarse gravel to the shallow water table at approximately 44 feet bgs. Shale bedrock has been encountered below the site at approximately 130 to 150 feet bgs. The topography of the site is generally flat with a slight decline toward the Wabash River.

Aquifers in this region are represented by sands and gravels within the surficial glacial deposits and with the underlying shale bedrock formations. IAWC operates municipal wells located less than 100 feet west of the Elm Street site. These wells are only used in peak season and the water is blended and treated with water from the main water supply. The main water supply is collected from a radial well located near the Wabash River (approximately1,200 feet west-northwest of the site), and consists of one vertical well with horizontal radial collectors extending below the Wabash River in southwest to northwest directions. Additionally, four deep municipal wells are used intermittently to supplement water when required for the area. This water supply is from the glacial sands and gravels extending well below the current ground surface elevation of the Elm Street site. The wellfield wells were installed in the same water-bearing zone just above the shale bedrock formation. All monitoring wells were installed in the same water bearing zone as the IAWC wells.

Elm Street Site Habitat

The site is in the Interior River Lowland ecoregion of Indiana. This ecoregion hosts a variety of land uses including forestry, agriculture, orchards, livestock production, and petroleum production.

The only potential terrestrial ecological habitat is near the Wabash River along the west edge of the site. Beyond the boundary of the site, the other major habitat is the aquatic habitat associated with the Wabash River. No wetlands are present on the site, however, a freshwater forested/shrub wetland is directly west along the Wabash River. The river itself is classified as a riverine wetland. The Wabash River serves as an important migration corridor for waterfowl and shorebirds such as ducks and geese. The river provides habitat for a large variety of fish including spotfin, emerald shiner, minnows, sunfish, and channel catfish.

Nature and Extent of Contamination

EPA divided the Elm Street site into four investigation areas. The four investigation areas (see Figures 3 through 7) were further divided into seven exposure areas plus the background area to determine the nature and extent of contamination:

- Background – this exposure area includes the area along the north side of Locust Street, beginning at North 2nd Street and wrapping around the east side of the site (east side of U.S. 41/North 3rd Street), with a final upgradient well (MW11) located south of MTS, between east-west and north-south segments of the CSX railroad.
- Gurman – this exposure area includes the Gurman facility.
- Ashland – this exposure area includes the Ashland facility.
- MTS – this exposure area includes the MTS facility.
- Sinclair – this exposure area includes the Sinclair exposure area east to the North 2nd facility.
- North 2nd Street– this exposure area is located between the MTS facility and the Sinclair facility.
- Riverside Apartment Complex – this exposure area includes the parcel of land upon which the Riverside Apartment Complex is located.
- IAWC – this exposure area includes the IAWC facility east to the Wabash River.

Figure 3: Ashland Pre-Demolition Site Features

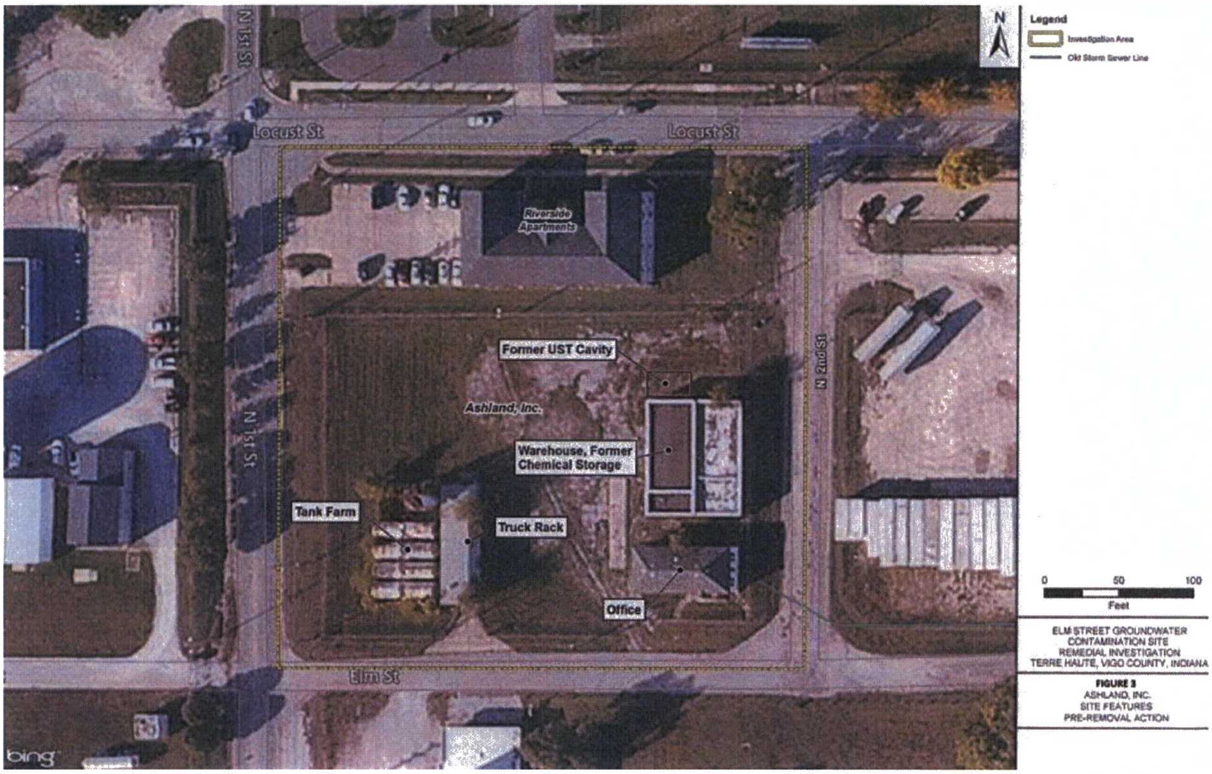


Figure 4: Ashland Post-Demolition Site Features

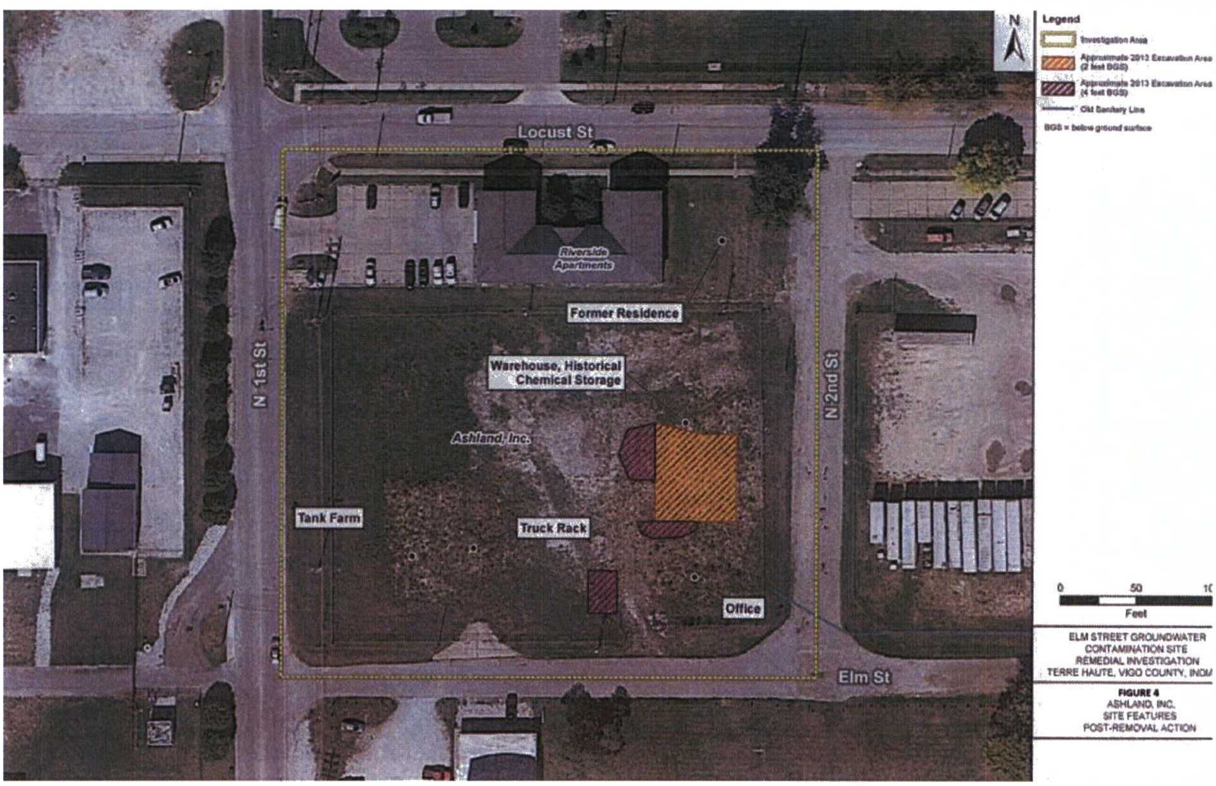


Figure 5: Gurman Site Features

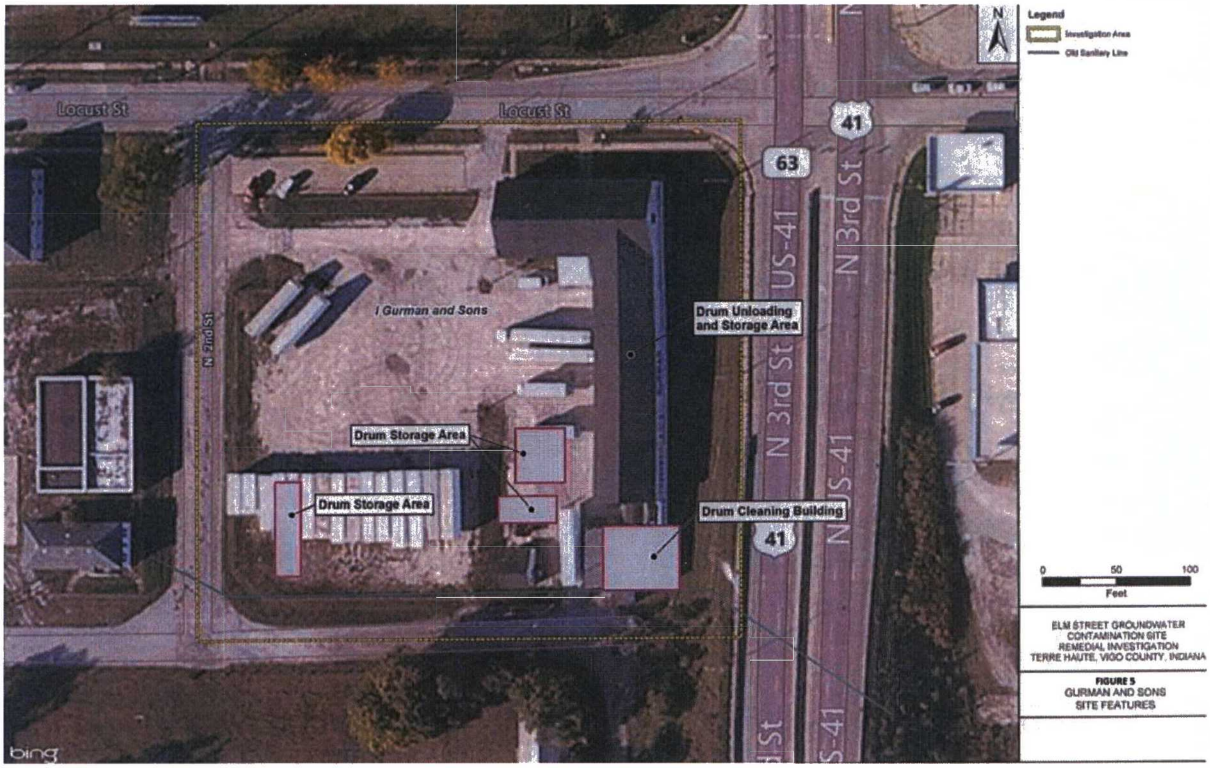


Figure 6: MTS Site Features

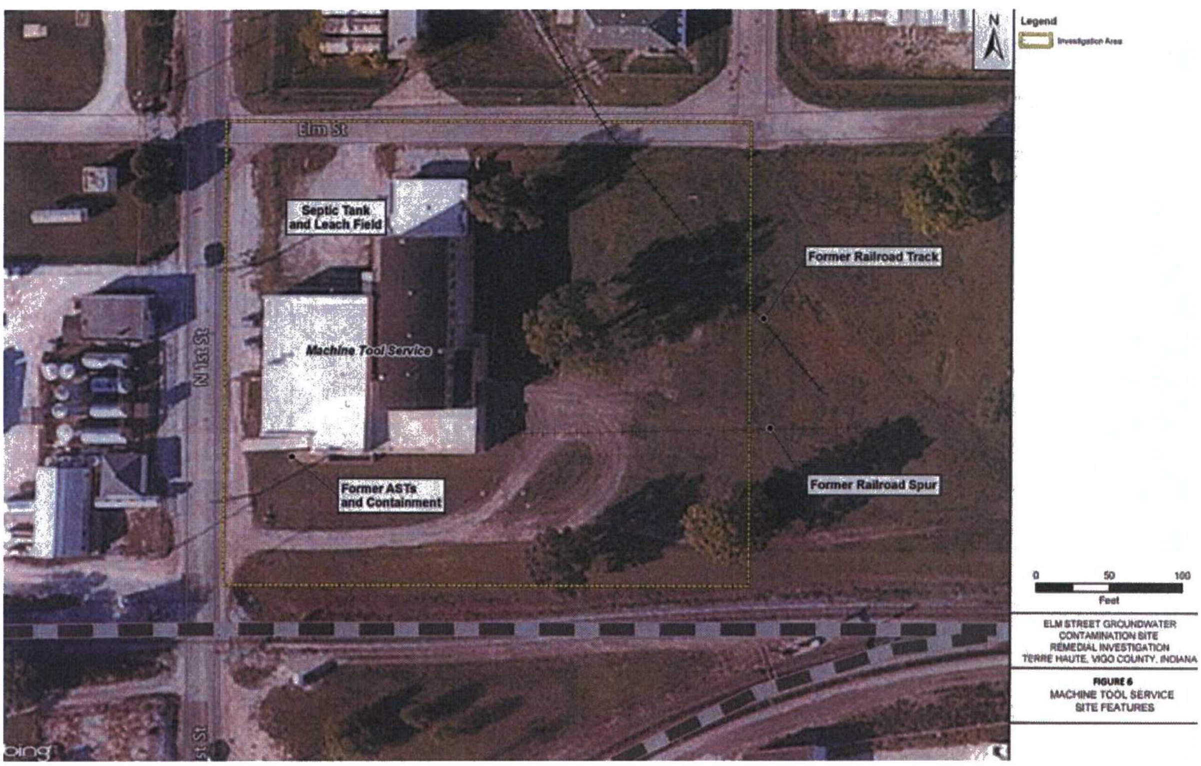
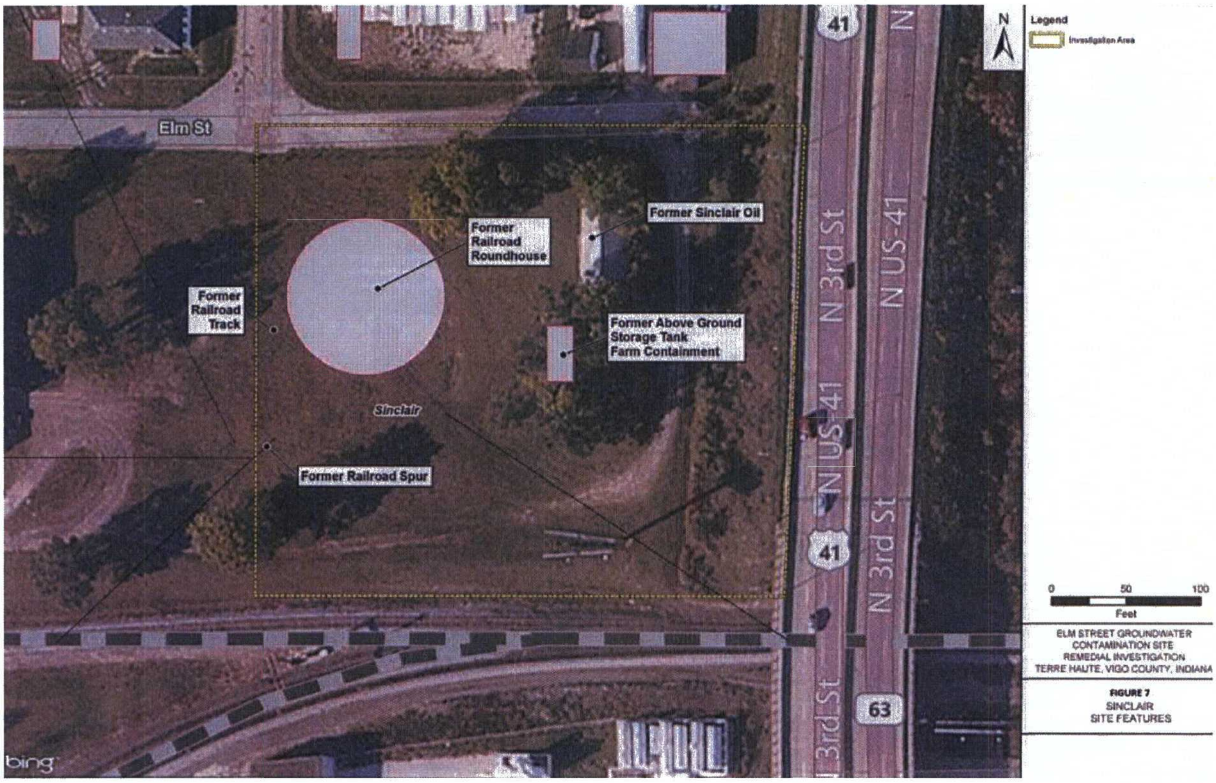


Figure 7: Sinclair Site Features



The seven exposure areas plus the background area were created to (1) separate the Riverside Apartment complex from Ashland, (2) designate the area where the former roundhouse was located between MTS and Sinclair as its own exposure area (North 2nd Street), and (3) separate the IAWC property west of North 1st Street from the rest of the site. Background areas for soil calculations and upgradient and down gradient areas for groundwater comparison were also identified. Background threshold value tables for surface and subsurface soil were presented and discussed in the RI.

Data were collected and compared with screening levels and established or calculated background concentrations to assess whether a chemical is potentially of concern (e.g., exceeds natural conditions), and if so, the extent of its distribution. Based on the recommendation from the Screening Level Ecological Assessment (SLERA) for the site, concentrations of chemicals of potential concern (COPC) detected in monitoring wells nearest the Wabash River did not exceed their respective Ecological Screening Values (ESV) and therefore, Ecological Screening Levels (ESLs) were not included in the evaluation of the nature and extent of contamination at the site.

Soil Contaminants Exceeding Region Screening Levels (RSLs)

Table 1 lists the VOCs, PAHs, PCBs, pesticides, and metals that exceeded the Residential RSLs at the site:

Table 1: Contaminants Exceeding Residential RSLs (units are in mg/kg)

Contaminant	Limit	Gurman	Ashland	MTS	Sinclair	N. 2nd	Riverside
VOCs							
TCE	0.94	ND- 5.10	ND-1.4				
1,1,2,2-Tetrachloroethane*	0.6			ND-5.4			
1,1,2-Trichloroethane*	1.1			ND-3.1J			
SVOCs							
Benzo(a)anthracene	0.16	ND-1.6J	ND-1.5	ND-23	ND-0.98	ND-1.1	
Benzo(a)pyrene	0.016	ND-1.2	ND-1.1	ND-20	ND-0.95	ND-1.2	
Benzo(b)fluoranthene	0.16	ND-1.6	ND-1.6	ND-25	ND-1.3	MD-2.1	
Indeno(1,2,3-cd)pyrene	0.16	ND-0.72	ND-0.35	ND-6	ND-0.59J	ND-0.72J	
Benzo(k)fluoranthene*	0.16			ND-12			
Chrysene*	16			ND-24			
Naphthalene*	3.8			ND-4.8			
Metals							
Arsenic	0.68	ND-14.6	ND-48.1J	ND-37.6	ND-41.6	ND-17.7	ND-6.5
Lead*	400	ND-675J					
Thallium	0.78	ND-2.5		ND-4.3			
Cobalt	23			ND-159			
Iron	55,000			ND-295,000			
Manganese	1,800			ND-5,500J			
Vanadium	390			ND-1,410			
Cyanide*	2.7	ND-3					
PCBs							
Aroclor-1260*	0.24				ND-3		
Aroclor-1254	0.24	ND-0.9J					
Pesticides							
Heptachlor*	0.13	ND-3.5J					
Heptachlor epoxide*	0.07	ND-0.22J					

*Found in one sample throughout the whole site.
ND: non-detect

Table 2 lists the VOCs, PAHs, PCBs, pesticides, and metals exceeded Industrial RSLs at the site:

Table 2: Contaminants Exceeding Industrial Residential RSLs (units are in mg/kg)

Contaminant	Limit	Gurman	Ashland	MTS	Sinclair	N. 2nd	Riverside
VOCs							
1,1,2,2-Tetrachloroethane*	2.7			ND-5.4			
SVOCs							
Benzo(a)anthracene	2.9			ND-23	ND-0.98		
Benzo(a)pyrene	0.29	ND-1.2	ND-1.1	ND-20	ND-0.95	ND-1.2	
Benzo(b)fluoranthene	2.9			ND-25			
Indeno(1,2,3-cd)pyrene	2.9			ND-6			
Metals							
Arsenic	3	ND-14.6	ND-48.1J	ND-37.6	ND-41.6	ND-17.7	ND-6.5
PCBs							
Aroclor-1260*	0.99				ND-3		
Pesticides							
Heptachlor*	0.63	ND-3.5J					

*Found in one sample throughout the whole site.
ND: non-detect

Table 3 lists the VOCs, PAHs, PCBs, pesticides, and metals that exceeded the IDEM Media to Groundwater Levels (MTGs) at the site.

Table 3: Contaminants Exceeding IDEM MTGs (units are in mg/kg)

Contaminant	Limit	Gurman	Ashland	MTS	Sinclair	N. 2nd	Riverside
VOCs							
TCE	0.94	ND- 5.10	ND-1.4				
1,1,2-Trichloroethane*	1.1			5.4			
Metals							
Arsenic	0.68	ND-14.6	ND-48.1J	ND-37.6	ND-41.6	ND-17.7	ND-6.5

*Found in one sample throughout the whole site.
ND: non-detect

Groundwater Contaminants Exceeding Human Health Screening Levels (HHSLs)

Table 4 lists the VOCs that exceeded the HHSLs in monitoring wells at the site.

Table 4: Contaminants Exceeding HHSLs in Groundwater (units are in µg/l)

Contaminant	Limit	Gurman	Ashland	MTS	Sinclair	N. 2nd	Riverside
VOCs							
PCE	5	5.5-7.8	6.5-7.6				
1,1,2,2-Tetrachloroethane*	0.66			1.1			

*Found in one sample throughout the whole site.

Table 5 lists the VOCs that exceeded the HHSLs in grab samples. Grab samples are considered "a snapshot in time".

Table 5: Contaminants Exceeding HHSLs in Groundwater (units are in µg/l)

Contaminant	Limit	Gurman	Ashland	MTS	Sinclair	N. 2nd	Riverside
VOCs							
PCE	5	ND-7.4	ND-8.2	ND-14	ND-11		
1,1,2,2-Tetrachloroethane*	0.66			ND-17			
1,2-Dichloropropane	5			ND-18			
Carbon Tetrachloride	5			ND-9.6			
Methylene Chloride	5						ND-5.5

*Found in one sample throughout the whole site.
ND: non-detect

Metals in groundwater were found in similar concentrations on-site and off-site.

Soil Vapor Contaminants Exceeding Human Health Screening Levels (HHSLs)

The results from sampling soil gas at Gurman, Ashland, MTS, and the Riverside Apartments exposure areas showed the following results:

Gurman: VOCs were detected in soil gas samples at the Gurman exposure area exceeding one or more HHSL, with the highest concentrations located on the southeastern portion of the exposure area (EA) near the drum processing area.

Ashland: VOCs were detected in soil gas samples at the Ashland exposure area exceeding one or more HHSL, with the highest concentrations located under the footprint of the former warehouse building generally from the deep soil gas wells near the groundwater table.

MTS: VOCs were detected in soil gas samples at the MTS exposure area exceeding one or more HHSL, with the highest concentrations located along the northern portion of the EA, north of the MTS building. All soil gas results that exceed screening levels were detected in the deep soil gas wells.

<u>Riverside Apartments</u>: VOCs were detected in soil gas samples at the Riverside Apartment exposures area exceeding one or more HHSLs, with the highest concentrations located along the southern portion of the exposure area, closest to the Ashland exposure area. Results that exceed screening levels were more frequent in shallow soil gas wells, but were varied, with highest concentrations for specific analytes varying between shallow and deep wells within a given well set.

Surface Water Contaminants Exceeding Human Health Screening Levels (HHSLs)

Arsenic was detected in one sample at the Wabash River with a concentration of 2.4 µg/l. The HHSL is 0.14 µg/l. This location was the farthest sampling location upstream of the Elm Street site, directly west of the radial collector well on the eastern bank of the Wabash River.

Conceptual Site Model

EPA developed Conceptual Site Models for the Elm Street site based on site characteristics and media sampling results (see Figures 8 and 9, next pages).

The primary source of contamination is historical operations at and discharges from the five primary industrial/commercial operations at the Elm Street site (Gurman, Ashland, MTS, Former Roundhouse Area, and Sinclair).

Five primary release/transport (R/T) mechanisms of contaminants of concern (COCs) to affected media include:

- Direct disposal of drum contents onto ground surface;
- Spills from locomotive repair/maintenance activities;
- Leaks from ASTs, drum storage areas, and tank farms;
- Leaks from sewers receiving rinsate from drum cleaning; and
- Leaks from USTs (including associated piping)

Contamination primarily spilled, leaked, or was released to the ground surface and is believed to have leached to the groundwater. Contaminants that have leached (or are leaching) to groundwater are migrating off-site with groundwater flow toward the Wabash River located west of the site. Also, volatile contaminants in groundwater may subsequently migrate to ambient air or into buildings through vapor intrusion. Similarly, volatile soil contaminants are expected to release to ambient air through volatilization and particulates (fugitive dust) emissions. Soil contaminants are also expected to be taken up (to varying degrees) into produce raised in on-site soil (i.e., homegrown produce).

Groundwater is the major contaminated medium identified for this site. If one assumes that the Wabash River is a gaining stream, discharge of groundwater occurs from the site to the aquatic habitat of the Wabash River. This causes surface water and sediment to be secondary contaminated media of concern. Therefore, potential direct exposure points for ecological receptors at the Elm Street site include sediment and surface water in the

Wabash River. The impact on sediment would be via movement of groundwater to the surface water through the sediments, and the groundwater would make up a significant portion of the sediment pore water. Pore water is the controlling factor for sediment toxicity.

Potential direct uptake mechanisms for ecological receptor include dermal contact/absorption and direct ingestion. Ecological receptors may also be exposed via consumption of prey/food items that have bioaccumulated/bioconcentrated constituents. However, given the class of contaminants identified in the groundwater at the site, VOCs, the bioaccumulation pathway is considered *de minimis* and will not be quantitatively evaluated.

Significant release/transport (R/T) mechanisms at the site include:

Direct Disposal of Drum Contents onto Surface Soil

Direct disposal is an important R/T mechanism because PAHs and metals are not very soluble and tend to sorb to soil particles. VOCs are soluble and tend to be mobile through soils and can leach/percolate to groundwater. PAHs, metals and VOCs are present in the soil at concentrations above screening levels. VOCs are present in the groundwater above screening levels.

Spills from Locomotive Repair/Maintenance Activities to Surface Soil

Spills are an important R/T mechanism because PAHs are not very soluble and tend to sorb to soil particles. PAHs are present in the soil at concentrations above screening levels.

Leaks from ASTs, Drum Storage Areas and Tank Farms

Leaks are an important R/T mechanism because PAHs are not very soluble and tend to sorb to soil particles. PAHs are present in the soil at concentrations above screening levels.

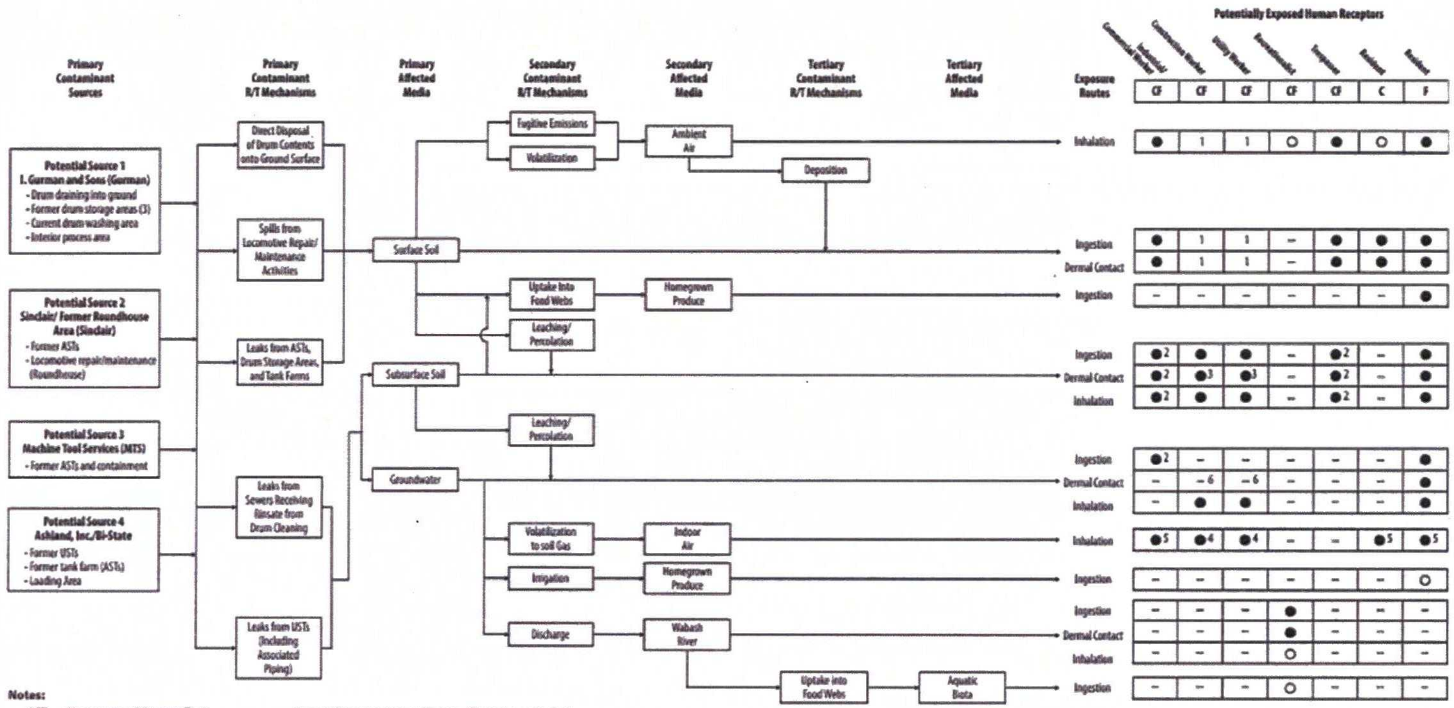
Leaks from USTs (including associated piping)

Leaks are an important R/T mechanism because VOCs and metals can impact subsurface soils and leach into the groundwater. VOCs and metals are present in the soil at concentrations above screening levels. VOCs can also volatilize into soil gas and percolate/leach into the groundwater.

Leaks from Sewers Receiving Rinsate from Drum Cleaning

Leaks are an important R/T mechanism because VOCs and metals can impact subsurface soils and can leach into the groundwater. VOCs and metals are present in the soil at concentrations above screening levels. VOCs can also volatilize into soil gas.

Figure 8: Human Health Conceptual Site Model



Notes:

AST = Aboveground Storage Tank
C = Current
F = Future
UST = Underground Storage Tank
R/T = Release/Transport

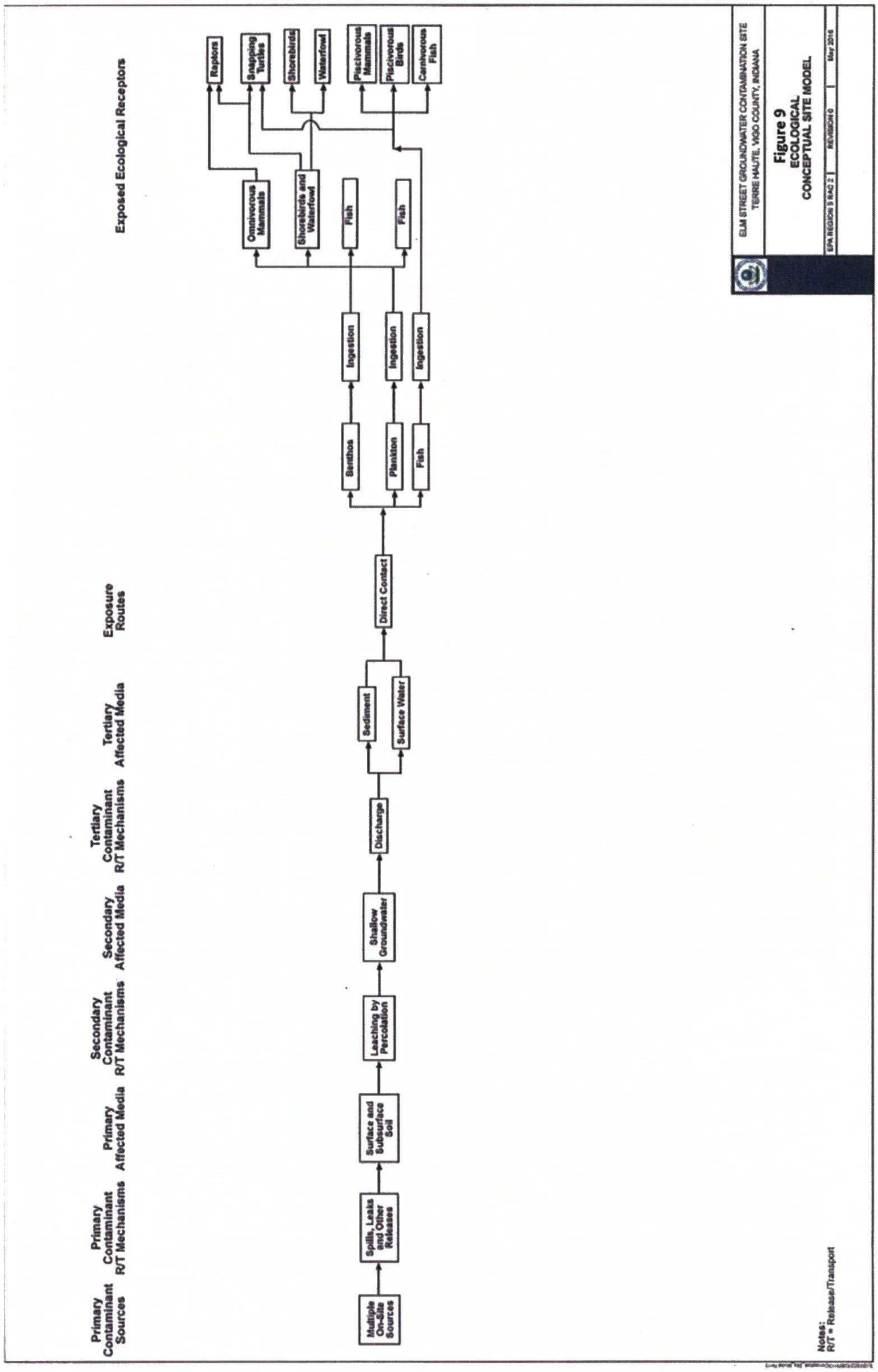
– = Incomplete exposure pathway; will not be evaluated
○ = Potentially complete but insignificant exposure pathway; will not be retained for quantitative analysis
● = Potentially complete exposure pathway; will be retained for quantitative analysis

1. Potential exposure to chemicals of potential concern (COPC) in surface soil is considered as part of exposure to subsurface soil (0 to 10 feet below ground surface [bgs]).
2. Exposure assumed to occur only to future example of this receptor.
3. Exposure limited to groundwater present above 10 feet bgs.
4. Exposure point concentrations for air in a construction of utility trench will be calculated using the methodology presented in the Virginia Department of Environmental Quality's (VDEQ) Voluntary Remediation Program Risk Assessment Guidance dated August 2014 (VDEQ 2014).
5. Exposure point concentrations in indoor air within residences and businesses will be calculated using U.S. Environmental Protection Agency (EPA), EPA Region 5, and Indiana Department of Environmental Management (IDEM) guidance (EPA 2014, 2015a, 2015d, IDEM 2010).
6. The depth to groundwater at the site is between 40 and 50 feet bgs; therefore, groundwater will not accumulate in trenches and these receptors will not be exposed to groundwater via dermal contact.

ELM STREET GROUNDWATER CONTAMINATION SITE
TERRE HAUTE, VIGO COUNTY, INDIANA

Figure 8
HUMAN HEALTH CONCEPTUAL SITE MODEL

Figure 9: Ecological Risk Conceptual Site Model



R/T mechanisms that are not significant at the site include:

Surface Soil to Ambient Air to Soil

Generally, COCs have the potential to migrate to ambient air by fugitive dust and volatilization and then back to surface soil. PAHs and metals in the surface soil are more likely to have been caused by leaks and spills of contaminants onto the surface soil. Contamination by fugitive emissions and volatilization would be minor compared to direct contact.

Surface Soil to Uptake into Food Webs

This area is a commercial/industrial area. Homegrown produce would not normally occur in this area. The area is likely to remain commercial/industrial and homegrown produce would not be done in these areas. Also, homegrown produce was not observed at the Riverside Apartments.

Groundwater to Irrigation

This area is a commercial/industrial area. Irrigation for homegrown produce would not normally occur in this area. The area is likely to remain commercial/industrial and homegrown produce would not be done in these areas. Also, homegrown produce was not observed at the Riverside Apartments.

Groundwater to River Discharge

Groundwater to river discharge was evaluated and contaminants were found not entering into the Wabash River. Therefore, there would be no impacts on uptake into food webs and aquatic biota.

2.6 Current and Potential Future Land and Resource Uses

Properties at the Elm Street site are zoned commercial or industrial with light industrial activities occurring on the Gurman and MTS properties. The Ashland property has been devoid of any structures since 2013. The Sinclair property had one storage warehouse and a parked semi-trailer at the time of the RI. The Riverside Apartment Complex is the only residential structure, but it is zoned commercial. The Riverside Apartment Complex primarily houses students attending Indiana State University. Properties north of the Riverside Apartment Complex are developed by Indiana State University for use in various sporting fields. South of the site is a property abandoned by MAB Paints. This property was purchased by the University's Board of Trustees and is being razed.

Future site use is projected to be similar to current levels. Once the PAHs, metals, and VOCs in the soil and groundwater are addressed the properties could be attractive for redevelopment.

2.7 Summary of Site Risks

EPA conducted a baseline risk assessment to evaluate the potential for human health and ecological risks due to the contaminants found at the Elm Street site. The human health risk assessment (HHRA) addressed potential risks to people due to ingestion and/or dermal contact with contaminated soil and groundwater. The ecological risk assessment (ERA) determined the potential for adverse impacts to riparian habitat associated with the Wabash River.

Human Health Risk Assessment

EPA evaluated human health risks for the following potential receptors at the Elm Street site:

- **Current and Future Trespasser:** Current and future trespassers were assumed exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface soil and subsurface soil.

- **Current and Future Resident:** Current and future residents at the Riverside Apartments may be exposed via inhalation of volatile contaminants that have migrated from subsurface soil and groundwater through soil gas to indoor air (i.e., vapor intrusion). Future residents at all Elm Street land-based exposure areas were assumed exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors, surface and subsurface soil, and ingestion of produce grown in surface and subsurface soil. In addition, future residents may be exposed via ingestion of and dermal contact with groundwater used as a source of potable water, and via inhalation of vapors that have migrated from groundwater to indoor air.

- **Current and Future Commercial/Industrial Workers:** Current industrial/commercial workers at the Gurman and MTS exposure areas were assumed to be exposed via incidental ingestions of, dermal contact with, and inhalation of particulates and vapors from surface soil, and via inhalation of vapors that have migrated from subsurface soil and groundwater through soil gas into indoor air via vapor intrusion. Future industrial/commercial workers were assumed exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil, and via ingestion of groundwater used as a source of potable water, and via inhalation of vapors that have migrated from groundwater to indoor air. Finally, workers at the IAWC exposure area were assumed to be potentially exposed via inhalation of volatile groundwater contaminants that have migrated into indoor air via vapor intrusion, as described above.

- **Current and Future Construction Worker:** Current and future construction workers were assumed exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil, and via inhalation of VOCs from the site while working inside construction trenches. (Note: the water table at the site is at 40 to 50 feet bgs, which is well below the typical depth of construction trenches.

Therefore, groundwater was assumed to not enter construction trenches, and construction workers were assumed to have no direct contact with groundwater.)

- **Current and Future Utility Worker:** Current and future utility workers were assumed exposed via incidental ingestion of, dermal contact with, and inhalation of particulates and vapors from surface and subsurface soil, and via inhalation of VOCs from the site while working inside utility trenches. (Note: the water table at the site is at 40 to 50 feet bgs, which is well below the typical depth of utility trenches. Therefore, groundwater was assumed to not enter utility trenches, and utility workers were assumed to have no direct contact with groundwater.)

- **Current and Future Recreationalist:** The Elm Street site is not expected to be developed for recreational purposes. However, the Wabash River is used for recreational purposes such as boating and fishing. Therefore, current and future recreationalists were assumed to be exposed to surface water via incidental ingestions and dermal contact. Sediment and aquatic life (fish) samples were not collected from the Wabash River.
In assessing the risks to humans, residential, and industrial/commercial worker contaminant screening levels were based on a target excess lifetime cancer risk (ELCR) of 1×10^{-6}, or one additional instance of cancer in one million persons exposed over a lifetime, and a non-cancer hazard index (HI) quotient of one (1). The HI quotient is a way of expressing the potential for non-carcinogenic health effects that may occur due to exposure to a dose of a chemical. An HI quotient greater than one indicates that there may be a concern for potential health effects. EPA's target risk range is 1×10^{-6} to 1×10^{-4} ELCR.

Table 6 gives a summary of risks at the site as calculated for each receptor in the exposure areas.

Table 6: Potential Human Health Risks at each Exposure Area

Exposure Area	Gurman	Ashland	MTS	N 2nd Street	Sinclair	Riverside	IAWC	Wabash River	Upgradient/ Background
Receptor	**ECLR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**	**ELCR HI**
Current Trespasser	5×10^{-6} C < 1 C 1×10^{-6} A < 1 A 2×10^{-6} Ad < 1 Ad	4×10^{-6}C < 1C 9×10^{-7}A < 1 A 1×10^{-6}Ad < 1 Ad	4×10^{-5}C < 1 C 7×10^{-6} A < 1 A 5×10^{-6}Ad < 1 Ad	4×10^{-6}C < 1C 9×10^{-7}A < 1 A 8×10^{-7}Ad < 1 Ad	3×10^{-6}C < 1 C 8×10^{-7}A < 1A 1×10^{-6} Ad < 1	4×10^{-7}C < 1 C 1×10^{-7}A < 1 A 2×10^{-7}Ad < 1 Ad	---------- ----		5×10^{-7}C < 1 C 1×10^{-7}A < 1 A 2×10^{-7} Ad < 1 Ad
Future Trespasser	3×10^{-6} C < 1 C 1×10^{-6} A < 1 A 1×10^{-6} Ad < 1 Ad	2×10^{-6}C < 1C 5×10^{-7}A < 1 A 7×10^{-7}Ad < 1 Ad	2×10^{-5}C < 1 C 4×10^{-6}A < 1 A 3×10^{-6}Ad < 1 Ad	3×10^{-6} < 1 6×10^{-7}A < 1 A 7×10^{-7}Ad < 1	3×10^{-6}C < 1 C 7×10^{-7} A < 1A 9×10^{-7} Ad < 1 Ad	4×10^{-7}C < 1 C 1×10^{-7}A < 1 A 2×10^{-7}Ad < 1 Ad	---------- -----		9×10^{-7}C < 1 C 2×10^{-7} A < 1 A 3×10^{-7} Ad <1 Ad
Current Resident	----------- -	----------- --	------------ -	-------------	------------ ----	5×10^{-5} 0.9	---------- -----		--------------- ----
Future Resident	3×10^{-3} 200 ss/gw 2×10^{-3} 200 sub/gw	2×10^{-3} 200 ss/gw 8×10^{-4} 100 sub/gw	2×10^{-3} 50 ss/gw 1×10^{-3} 60 sub/gw	5×10^{-4} 200 ss/gw 4×10^{-4} 100 sub/gw	4×10^{-4} 50 ss/gw 4×10^{-4} 40 sub/gw	2×10^{-4} 20 ss/gw 2×10^{-4} 20 sub/gw	2×10^{-6} < 1 gw		5×10^{-5} 8 ss/gw 5×10^{-5} 30 sub/gw
Current Commercial/ Industrial Worker	1×10^{-4} 30	1×10^{-4} 20	4×10^{-5} < 1	6×10^{-5} 4	6×10^{-5} 4	------------	5×10^{-7} < 1		3×10^{-6} < 1
Future Commercial/ Industrial Worker	2×10^{-4} 30	9×10^{-5} 20	9×10^{-5} 4	6×10^{-5} 4	6×10^{-5} 4	6×10^{-5} 4	5×10^{-7} < 1		3×10^{-6} < 1
Current Construction Worker	2×10^{-6} 1	8×10^{-7} < 1	3×10^{-6} 2	8×10^{-7} < 1	1×10^{-6} < 1	3×10^{-7} < 1	4×10^{-10} < 1		3×10^{-7} < 1
Future Construction Worker	2×10^{-6} 1	8×10^{-7} < 1	3×10^{-6} 2	8×10^{-7} < 1	1×10^{-6} < 1	3×10^{-7} < 1	4×10^{-10} < 1		3×10^{-7} < 1
Current Utility Worker	4×10^{-6} < 1	2×10^{-6} < 1	6×10^{-6} < 1	2×10^{-6} < 1	2×10^{-6} < 1	6×10^{-7} < 1	8×10^{-10} < 1		6×10^{-7} < 1
Future Utility Worker	4×10^{-6} < 1	2×10^{-6} < 1	6×10^{-6} < 1	2×10^{-6} < 1	2×10^{-6} < 1	6×10^{-7} < 1	8×10^{-10} < 1		6×10^{-7} < 1
Current Swimmer								< 1×10^{-6} < 1	
Future Swimmer								< 1×10^{-6} < 1	

Notes: Red = exceeds risk targets. C: child, A: adolescent, Ad: Adult, ss/gw: surface soil/groundwater, sub/gw: subsurface soil/groundwater

- According to the Beacon website for Vigo County, all the properties at the Elm Street site are either zoned commercial or industrial, including the Riverside Apartments.
- Indiana American Water Company provides municipal drinking water to the residences and businesses in Terre Haute.
- Future residents ELCR is driven primarily by consumption of metals and PAHs through incidental ingestion and consuming homegrown produce via surface soil and consumption of arsenic and VOCs via groundwater. The HI is primarily driven by ingestion of metals and VOCs in soil and groundwater. The Gurman exposure area has the addition of pesticides for both ELCR and HI.
- Commercial/Industrial Workers HI values at Gurman and Ashland exposure areas are primarily driven by inhalation of VOCs via groundwater. The Future Commercial/Industrial Workers' ELCR at the Gurman exposure area is primarily through consumption of VOCs in groundwater.
- Commercial/Industrial Workers' HI values for the MTS, N 2nd Street, Sinclair, and Riverside Apartments areas are primarily for ingestion of thallium via groundwater.
- Construction workers HI at the MTS exposure area had no individual HIs above 1. Future Resident HI at the Upgradient/Background exposure area is primarily through ingestion of metals in the soil via homegrown produce.

HHRA Conclusions

Total risks exceed 1×10^{-4} ELCR, the upper end of EPA's target risk range, only for future residents at the Gurman, Ashland, MTS, North 2nd Street, Sinclair, and Riverside Apartments exposure areas. The assumption is that future residents would live in slab structures and use potable groundwater rather than municipal water.

Total risks are less than 1×10^{-6} ELCR, and considered insignificant, primarily for some combination of trespassers, construction workers, and utility workers at Ashland, North 2nd Street, Sinclair, Riverside Apartments, IAWC, Wabash River, and Background/Upgradient exposure areas.

Total hazards greater than 3 are primarily for future residents and future commercial/industrial workers at the Gurman, Ashland, MTS, North 2nd Street, Sinclair, Riverside, and Background/Upgradient exposure areas. The assumption is that future residents would live in slab structures and use potable groundwater rather than municipal water.

Total hazards less than 1 and considered insignificant, primarily for some combination of trespassers, construction workers, and utility workers at the Ashland, MTS, North 2nd Street, Sinclair, Riverside, IAWC, Wabash River (all swimmers), and Background/Upgradient exposure areas.

Primary contaminants found in soil are arsenic and PAHs. Primary contaminants found in groundwater are metals and VOCs.

Ingestion of homegrown produce dominates future residential soil risk and hazard results contributing 70-98 percent of the total risk or hazard depending on the exposure area. Vapor intrusion risks were identified at the Gurman, Ashland, North 2nd Street, and Riverside Apartments exposure areas. No individual HI was greater than 1 for current residents at the Riverside Apartments.

Primary uncertainty in the risk assessment include assumptions in the future use of the individual properties at the site. They are unlikely to be developed into residential properties in the future.

Widespread, ambient background impacts as a result of historical activities are typical of industrial settings such as that of the Elm Street site. Uncertainty is associated with determining whether concentrations of some chemicals detected at the Elm Street site, and the resultant risks, are site-related, or are attributable to the industrial character of the area, or are naturally occurring in background.

Ecological Risk Assessment

EPA evaluated the potential for adverse effects on ecological receptors by establishing baseline conditions at the site and then calculating potential impacts based on factors such as exposure levels of contaminants found at the site and the potential effects that the contaminants could have on organisms. As for human health risks, EPA calculates a hazard quotient (HQ) for organisms, with a threshold value of 1. Generally, the higher the HQ, the greater the likelihood a toxic effect will occur. Although probabilities cannot be specified based on a point-estimate approach, an HQ of 1 is usually regarded as indicating a low probability of adverse ecological effects. An HQ greater than 1, however, does not imply that adverse effects will occur – only that adverse effects could occur.

Habitat

The two habitats observed at the site are the aquatic habitat of the Wabash River and the forested area next to the Wabash River. During the habitat evaluation, the forested area apparently was not directly affected by discharges of groundwater based on the depth of the groundwater; therefore, this habitat was not considered a complete exposure pathway and was not further evaluated. Therefore, the focus was on the riparian habitat associated with the Wabash River. The following assessment endpoints were evaluated: 1) ensure adequate protection of the benthic and aquatic communities in the Wabash River by protecting them from the deleterious effects of acute and chronic exposures to site-related contaminants present in the river, and 2) ensure adequate protection of threatened and endangered species (including candidate species) and species of special concern and their habitats by protecting them from the deleterious effects of acute and chronic exposure to site-related contaminants.

ERA Results

To evaluate the potential of the discharge of contaminated groundwater to the aquatic community in the Wabash River, site-wide concentrations of contaminants in the groundwater plume were compared with surface water ESVs to identify contaminants at concentrations that could cause an impact. Two constituents were at maximum detected concentrations (total) that resulted in HQs exceeding the EPA threshold value of 1, indicating potential for ecological effects. The contaminants of potential ecological concern (COPECs) and the maximum HQ for each were chloroform (HQ=1.3) and toluene (HQ=2.6).

These concentrations were identified in the sample collected from a location near the IAWC facility. The chloroform and toluene concentrations decreased in the sample locations closer to the river and were below the screening values in the monitoring wells evaluated. This indicates that groundwater concentrations of chloroform and toluene likely are below their screening values as groundwater enters the Wabash River.

ERA Conclusions

Based on the above results, aquatic receptors exposed to Wabash River surface water are not at risk for adverse effects.

2.8 Remedial Action Objectives

EPA developed the following Remedial Action Objectives (RAOs) to protect the public and the environment from potential health risks posed by the contaminants at the site:

Soils

- Prevent current and future receptors from direct contact exposure to soil COCs posing a total cancer risk (TCR) in excess of 1×10^{-6} or a HI greater than 1.
- Minimize leaching of VOCs from soil to groundwater.

Groundwater

- Prevent current and future residential receptors from direct ingestion exposure to COCs in excess of TCR 1×10^{-6} or a HI of 1.
- Protect new and existing IAWC public supply wells from site-related groundwater impacts.
- Restore groundwater to its beneficial uses (reduce concentrations of COCs to less than their Safe Drinking Water Act MCLs).

Vapor Intrusion

- Protect current receptors from VI exposure posing a TCR in excess of 1×10^{-4} or a HI greater than 1.
- Identify land-use or operational changes that could potentially result in VI exposure to future receptors posing a TCR in excess of 1×10^{-4} or a HI greater than 1.

An RAO for mitigating vapor intrusion is included, but has not been developed at this time as vapor intrusion mitigation may be considered in the future if land use changes from its current conditions. Based on risk assessment results, the following vapor intrusion risks (TCR > 1 x 10^{-6}) and hazards (HI >1) were identified:

- Future residents and current/future commercial/industrial workers at Gurman driven by TCE, PCE, 1,1-DCA, 1,1,2-TCA, and chloroform;
- Future residents and future commercial/industrial workers at Ashland driven by TCE and PCE;
- Future residents and future commercial/industrial workers (total risks only) at North 2nd Street driven by chloroform;
- Current and future residents and future commercial/industrial workers (total risk only) at Riverside Apartments driven by chloroform, PCE, and acrolein; and
- Future residents at IAWC driven by chloroform.

Although risks and hazards were identified above EPA's point of departure threshold levels (TCR > 1 x 10^{-6} and/or HI > 1), several points should be noted. First, chloroform is not considered a site-related risk driver for the following reasons: (1) it was detected in upgradient groundwater samples, (2) site groundwater concentrations were well below the MCL for trihalomethanes, and (3) chloroform – trihalomethanes in general – is often associated with chlorination of public water supplies and is commonly present in the environment. Therefore, eliminating chloroform from the list of site-related COCs results in potential cancer risks and hazards is warranted.

Second, for current land use, the vast majority of VI cancer risks and noncancer hazards at each of the exposure areas are within EPA's acceptable risk range (TCR between 1 x 10^{-6} and 1 x 10^{-4} and HI < 1). For a future residential land use scenario, total cancer risk and noncancer hazards are greater than 1 x 10^{-4} and 1, respectively, at both Gurman and Ashland.

Third, all current and future risks and hazards at Riverside Apartments are within EPA's risk range and less than 1 when eliminating acrolein from consideration. Acrolein is the only chemical with a hazard index (HI) greater than 1 (HI =1.3). For multiple reasons, acrolein was eliminated as a COC. These reasons include (1) its low frequency, (2) conventional rounding practices, and (3) concerns regarding its usability. Usability concerns are as follows: EPA's School Air Toxics Initiative – a national air-sampling program that investigates ambient air quality near schools and the Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) have concluded that acrolein cannot be measured in an accurate and valid way. In addition, other chemical compounds can react to form acrolein, potentially even from within the Summa canisters used for collecting the soil vapor and ambient air.

Fourth, the lack of a defined VOC source, background conditions resulting from contribution of vapors from the Gurman operations, and current or reasonably anticipated future land uses at Gurman, support the position to defer potential VI mitigation at Gurman to a later time if business operations change. The lack of a defined VOC source and current or reasonably anticipated future land uses at Ashland (all the buildings have been razed and is a fenced open field) support the position to defer potential VI mitigation at Ashland to a later time if land use changes. As a result, screening of remedial technologies and process options, and development of remedial alternatives to address potential VI issues are not included. If VI mitigation is deemed necessary by EPA in the future, some examples of potential mitigation activities that could be implemented include the following: (1) installing ventilation systems to existing and new buildings, (2) installing sub-slab depressurization systems to existing and new buildings, and (3) installing vapor barriers during new construction.

Target Cleanup Levels

Based on the extent of contamination and the receptors potentially at risk, EPA identified primarily PAHs and metals as COCs in soils for human receptors. EPA also identified VOCs as COCs in the groundwater for human receptors.

Human Health Based Cleanup Levels

For each COC, a risk-based remediation goal (RG) was back-calculated to correspond with the lower of a TCR of 1×10^{-6} and non-cancer hazard of 1. In addition, for metals, site-specific background threshold values (BTVs) were also taken into consideration. For purposes of developing soil RGs, the following items were factored in when deriving COC-specific RGs: 1) current and future residential land use was assumed to be the most likely land use at the Riverside Apartments exposure area, 2) current and future industrial land use was assumed to be the most likely land use for all other EAs, 3) for the assumed land use (and resulting exposure scenarios), the RGs are back calculated using a TCR of 1×10^{-6} and an HI of 1 for all chemicals except arsenic, 4) given the widespread distribution of arsenic, the 1×10^{-5} risk level is protective, which is still lower than arsenic RGs for numerous other Superfund sites in Region 5, and 5) the oral slope factor for benzo(a)pyrene was revised by EPA resulting in a back-calculated RG roughly seven times higher than SLs used in the RI and HHRA.

Based on the assumptions listed above, the following RGs and the basis for selecting them are proposed to achieve the soil risk-based RAO.

- Arsenic – 7.4 mg/kg is the site-specific BTV; however, using the lower of 1×10^{-5}/HI=1 concentrations, the RG becomes 30 mg/kg based on the TCR concentration.
- Manganese – 3,200 mg/kg based on the non-cancer hazard concentration
- Alpha-chlordane – 7.7 mg/kg based on the TCR concentration
- Gamma-chlordane – 7.7 mg/kg based on the TCR concentration
- Heptachlor – 0.63 mg/kg based on the TCR concentration
- Heptachlor epoxide – 0.33 mg/kg based on the TCR concentration
- Benzo(a)pyrene – 2.1 mg/kg based on the TCR concentration
- Benzo(a)anthracene – 21 mg/kg based on the TCR concentration
- Benzo(a)fluoranthene – 21 mg/kg based on the TCR concentration
- Benzo(a)pyrene equivalents – 2.1 mg/kg based on the TCR concentration

- Aroclor-1254 – 0.99 mg/kg based on the TCR concentration
- Aroclor-1260 – 0.99 mg/kg based on the TCR concentration

In addition to risk-based RGs, chemicals detected in soil were also compared to IDEM MTG values to assess whether they are present at concentrations in soil that could adversely impact groundwater. Based on a comparison of soil concentrations at the site to IDEM's MTG values, the following RGs and the basis for selecting them are proposed to achieve the soil MTG RAO.

- Arsenic – 5.9 mg/kg is the IDEM MTG value; however, using the soil BTV of 7.4 mg/kg, the RG becomes 7.4 mg/kg based on background at the site.
- PCE – 0.045 mg/kg based on IDEM MTG value
- TCE – 0.036 mg/kg based on IDEM MTG value
- 1,1,2-TCA – 0.032 mg/kg based on IDEM MTG value
- 1,1-DCA – 0.15 mg/kg based on IDEM MTG value

The following RGs are proposed to achieve the groundwater RAOs. The proposed RGs for groundwater and the basis for selecting them are identified below.

- PCE – 5 μg/L based on the EPA SDWA MCL
- 1,1,2-TCA – 5 μg/L based on the EPA SDWA MCL
- 1,2-dichloropropane – 5 μg/L based on the EPA SDWA MCL
- Carbon tetrachloride – 5 μg/L based on the EPA SDWA MCL
- 1,1,2,2-PCA – 0.66 μg/L based on IDEM Remediation Closure Guide (IDEM 2012) (no MCL exists for this contaminant)

The metals retained as COCs in the HHRA include arsenic and thallium. The table below compares metals in wells at the site to background wells and total metals concentrations to dissolved metals concentrations.

Table 7: Comparison of Groundwater Metals Background Data vs. Site Data

Background Wells			**Site Wells (excluding MW-13S)**		
Metal	Total Metals Range	Dissolved Metals Range	Metal	Total Metals Range	Dissolved Metals Range
Arsenic	11.9 – 39.4	ND	Arsenic	16.8 – 23.5	ND
Cobalt	7.4	ND	Cobalt	4.9 – 21.4	ND
Iron	53,200	ND	Iron	13,400 – 23,400	ND
Lead	65.4	ND	Lead	ND	ND
Manganese	343 – 1,400	347 - 482	Manganese	334 – 1,290	334 – 508
Thallium	ND	ND	Thallium	2.1	2.1
Zinc	ND	ND	Zinc	ND	11,300

ND: Non-detect

As shown in the table above, the majority of metals detected in wells at the site were also detected in some of the upgradient background wells at similar concentrations. In addition, elevated levels of metals samples in groundwater were primarily detected in the total metals samples and not in the filtered metals samples. This indicates that elevated levels of metals may be associated with suspended particulates rather than dissolved in groundwater and are less likely to migrate significant distances. Metals at the site appear to be ubiquitous and no MTG RG has been established.

Figure 10: Soil sample locations exceeding human health risk based RGs

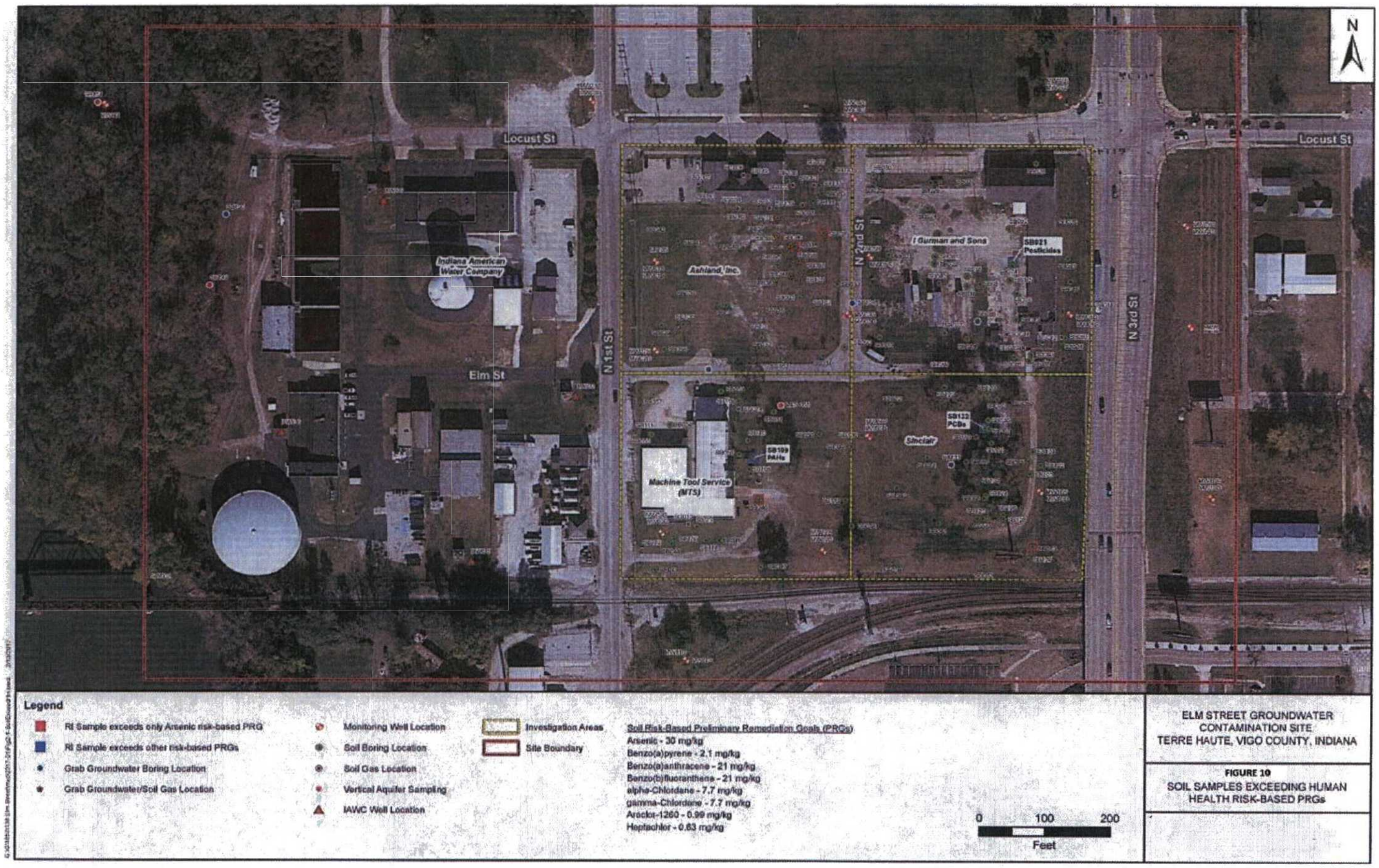


Figure 11: Soil sample locations exceeding migration to groundwater RGs

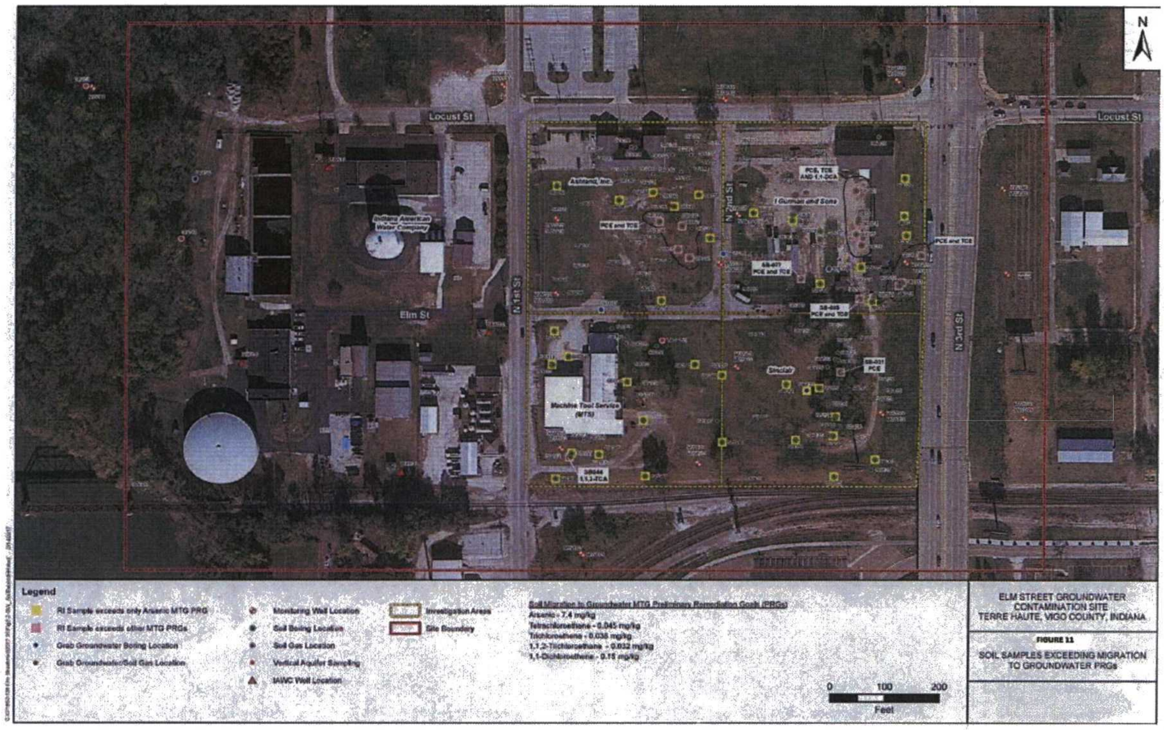
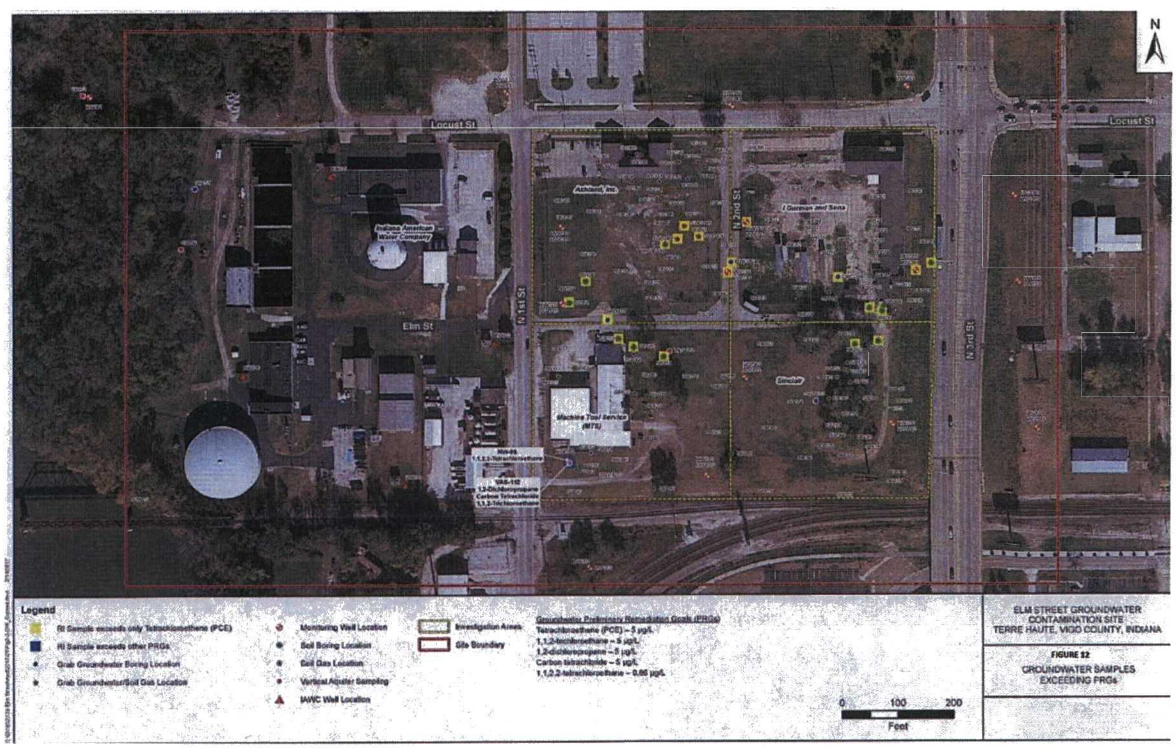


Figure 12: Groundwater sample locations exceeding RGs



Basis For Taking Action

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances to the environment.

2.9 Description of Alternatives

EPA evaluated the following remedial alternatives to address contaminated soil in the Elm Street Feasibility Study:

Alternative S-1 - No Action
Alternative S-2 – Capping and Institutional Controls
Alternative S-3 – Soil Vapor Extraction (SVE), Soil Excavation with Off-site Disposal, and Institutional Controls
Alternative S-4 – Capping, Soil Excavation with Off-site Disposal, and Institutional Controls

<u>Common elements</u>

Alternatives S-2, S-3, and S-4 would use ICs (*e.g.* deed restrictions such as an easement or covenant) to limit human exposure to contaminated soil and groundwater. The type of restriction and enforceability would need to be determined for the selected remedy in the ROD. However, none of the remedies rely exclusively on ICs to achieve protectiveness.

Alternative S-1: No Action

Under this alternative, EPA would take no action at the site to prevent exposure to the soil contamination. There is no cost associated with this alternative. This alternative is developed and retained as a baseline to which the other alternatives may be compared.

Estimated Capital Cost· $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction/Implementation Timeframe None
Estimated time to Achieve RAOs: Does not achieve RAOs where contaminated soils remain

Alternative S-2: Capping and Institutional Controls

Under this alternative, EPA would rely on a combination of ICs and installation of multiple caps (clay, soil, asphalt, or concrete) in areas of the Elm Street site where contamination remains at concentrations above human health RGs. In addition, the caps would be installed over areas of soil containing contaminants exceeding the soil-migration-to-groundwater criteria, thus reducing infiltration from precipitation in these areas, and thereby reducing the leaching of contaminants to groundwater.

Clay and topsoil would likely be used in all areas except for the area along the west side of the Gurman building and the area southeast of the MTS building. These areas would likely require asphalt or concrete due to vehicle traffic that would regularly occur as a result of their operations. Groundwater monitoring would be required to ensure that groundwater is not becoming further contaminated by soil. A monitoring program would be established as part of the selected groundwater alternative and locations throughout the Elm Street site would be selected for periodic sampling to confirm the absence or presence of contamination.

EPA would implement ICs to restrict future land use by preventing specific areas of the site from being zoned for residential use, requiring maintenance of the caps into perpetuity, and preventing excavation of soil by future landowners or occupants. These controls would be put in place to (1) prevent the potential for direct contact with or ingestion of any contaminated soils and (2) to maintain caps that reduce infiltration through the soil.

Estimated Capital Cost: $600,000
Estimated IC Cost: $21,000
Estimated Annual O&M Cost: $41,000
Estimated Total Present Worth Cost: $1.6 MM
Estimated Construction/Implementation Timeframe: 8 months
Estimated time to Achieve RAOs: 8 months

Alternative S-3: SVE, Soil Excavation with Off-site Disposal, and Institutional Controls

Under this alternative, EPA would require SVE system installation in areas where VOC-impacted soil extends to depths greater than typically accessible by excavation of contaminated soil and in other areas where contamination does not extend as deep. Excavated soil would be disposed off-site and replaced with clean soil.

Targeted SVE areas include one area at the southern part of the MTS facility, one area at Ashland facility, and three areas at Gurman facility. It would also require excavation and off-site disposal of accessible (shallower) soil contaminated with VOCs, arsenic, PAHs, pesticides, and PCBs (Aroclors 1254 and 1260). This alternative assumes that the majority of the contaminated soil excavated would require disposal as non-hazardous waste and a small percentage would be characterized as hazardous or TSCA waste. Thus, excavated soil would be disposed of offsite in both a licensed hazardous waste/TSCA waste facility and a licensed non-hazardous waste facility.

Prior to installation of the SVE system, a pilot-test would be performed to determine the vacuum, soil vapor flow rate, and well radius of influence (ROI) needed to design the system. Because of the depth of VOC contamination, potential access restrictions, the possible presence of underground utilities, and limited areas for subsurface work, it is expected that a series of vertical extraction points will be installed to target the VOC contamination. The sandy soils at the site are expected to be very conducive to VOC remediation by SVE, with high ROI for each SVE well. The blower for the SVE system would connect to a vertical stack to vent the extracted vapors to the atmosphere. It is unlikely that VOCs concentrations would exceed discharge limits, but if they do, then a granular-activated carbon (GAC) system would be used to treat the VOC emissions. The pilot test would determine the need for GAC. The SVE discharge would also be sampled periodically to determine if there is a reduction in contamination.

EPA would require ICs (for areas where concentrations of contaminants in soil remain above the RGs) to restrict disturbance of contaminated soil in the SVE area. Groundwater monitoring, as part of the groundwater remedy, would be used to monitor the reduction and migration of groundwater contaminants. Based on the results of the groundwater monitoring program, ICs for soil may be modified or discontinued.

Estimated Capital Cost: $1.1 MM
Estimated IC Cost: $21,000
Estimated Annual O&M Cost: $59,000
Estimated Total Present Worth Cost: $1.6 MM
Estimated Construction/Implementation Timeframe· 12 months
Estimated time to Achieve RAOs: 3 years

Alternative S-4: Capping, Soil Excavation with Off-site Disposal, and Institutional Controls

Under this alternative, EPA would require capping of soil at locations where VOCs are present in subsurface soil at depths that would make excavation unfeasible. It would also require excavation and off-site disposal of shallower accessible contaminated soil (not located under a building foundation).

To reduce migration of contaminants from the soil to groundwater, soil excavation would be conducted in designated areas of the site where VOC, arsenic, PAHs, pesticide, and PCB contamination is present. Soil excavation would proceed at depths reachable by standard excavation equipment. Deeper VOC-contaminated soil would be capped at locations where it is present beyond depths reachable by standard excavation equipment. Clay and topsoil will likely be used for capping in all areas except for the area along the west side of the Gurman building. The area would likely require asphalt or concrete due to the vehicle traffic that would regularly occur as a result of their operations.

EPA would require ICs to restrict access to soil in the capped areas of the site and prohibit future residential land use. Potential for direct contact with or ingestion of any contaminated soil would be reduced through ICs.

Groundwater monitoring, as part of the groundwater remedy, would be used to monitor the reduction and migration of groundwater contaminants.

Estimated Capital Cost: $760,000
Estimated IC Cost: $21,000
Estimated Annual O&M Cost: $34,000
Estimated Total Present Worth Cost: $1.6 MM
Estimated Construction/Implementation Timeframe: 8 months
Estimated time to Achieve RAOs: 8 months

EPA evaluated the following remedial alternatives to address contaminated groundwater in the Elm Street FS Report:

Alternative GW-1 – No Action
Alternative GW-2 – Groundwater Monitoring and ICs
Alternative GW-3 – Enhanced Reductive Dechlorination (ERD) and ICs
Alternative GW-4 – In-situ Chemical Oxidation or In-situ Chemical Reduction (ISCO or ISCR) and ICs
Alternative GW-5 – Pump-and-Treat and ICs

Common elements

All alternatives would use ICs (*e.g.* environmental covenants) to limit human exposure to contaminated groundwater. The type of restriction and method for enforcement would need to be determined for the selected remedy in the ROD. However, none of the remedies rely exclusively on ICs to achieve protectiveness.

Alternative GW-1: No Action

Under this alternative, EPA would take no action at the site to prevent exposure to the soil contamination. There is no cost associated with this alternative. This alternative is developed and retained as a baseline to which the other alternatives may be compared.

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction/Implementation Timeframe: None
Estimated time to Achieve RAOs: Does not achieve RAOs where contaminated groundwater remains

Alternative GW-2: Groundwater Monitoring and ICs

Under this alternative, EPA would rely on groundwater monitoring to measure groundwater contaminants and to evaluate the effectiveness of the soil remedy. Institutional controls would be used to restrict groundwater use. Groundwater would be monitored until RGs are met. Additional monitoring wells would be installed to provide supplementary data collection used to evaluate the effectiveness and to monitor the progress of the remedy.

Groundwater contamination reduction is expected through source removal and treatment. The locations that exceed the RGs for PCE at the Elm Street site are fairly contiguous and marginally exceed the remediation goals.

It is assumed that four monitoring well pairs would be installed within the groundwater plume to provide data collection points. In addition, it is assumed that five sentinel well pairs will be installed on the west side of North 1st Street, between the groundwater plume and Terre Haute's wellfield. These sentinel wells would also be included in the groundwater monitoring data collection process. The monitoring and sentinel wells would be comprised of nested wells installed at shallow and deep portions of the aquifer. The specific locations would be selected based on data collected to date, accessibility and presence of underground utilities.

During the RI, groundwater samples were not analyzed for monitored natural attenuation (MNA) parameters. However, field parameters including dissolved oxygen (DO) and oxidation/reduction potential (ORP) were measured and have been used to evaluate aquifer geochemistry. Degradation products, TCE and *cis*-DCE have been infrequently detected in groundwater at very low levels. Vinyl chloride has not been detected, indicating that some anaerobic biodegradation may be occurring naturally. Also, IDEM soil sampling from the late 1980s showed PCE, TCE, 1,1,1-TCA, trans-1,2-DCE, and 1,1-DCA near the Gurman facility. Further evaluation of groundwater chemistry would be necessary to fully assess the long-term effectiveness, speed, and applicability of MNA at the site.

MNA could be shown to be feasible and would further demonstrate the potential for reduction of contaminants through the degradation of the PCE in the groundwater. Data would need to be gathered for a trend analysis through the groundwater sampling.

Groundwater sampling for MNA would include VOCs, nitrate, ferrous iron, sulfate, methane, alkalinity, dissolved hydrogen, chloride, and field parameters such as pH, temperature, dissolved oxygen, oxidation-reduction potential, and conductivity.

Groundwater sampling to evaluate groundwater contamination would be performed quarterly for the first two years, semi-annually for the next 7 years, then annually until the VOCs have met RGs.

Estimated Capital Cost: $205,000
Estimated IC Cost: $21,000
Estimated Annual O&M Cost: $65,000
Estimated Total Present Worth Cost: $2.2 MM
Estimated Construction/Implementation Timeframe. 4 months
Estimated time to Achieve RAOs: 10-20 years

Alternative GW-3: ERD and ICs

Under this alternative, EPA would treat the contaminant plume through ERD which provides biostimulation and bioaugmentation. Additional monitoring wells would be installed to monitor progress of the remedy and as sentinel wells to Terre Haute's wellfield. Institutional controls would be implemented to prevent human exposure to contaminated groundwater until remediation goals have been attained.

The risk of discharging elevated concentrations of daughter products would decrease with distance from the source because the concentration of PCE being treated would decrease. Therefore, it is unlikely that daughter products from treatment would affect the wellfield. Based on reasonable assumptions, the daughter product plume would take 1 to 3 years to reach the Terre Haute's wellfield and the compounds would be expected to attenuate and disperse prior to reaching the wellfield. Naturally occurring metals solubilized by treatment are not expected to migrate more than a few hundred feet beyond the treatment area and are not expected to reach the wellfield.

ERD would involve biostimulation and bioaugmentation. Depending on the method of injection, biostimulation may employ generic substrates such as sodium lactate, or proprietary timed-release substrates such as emulsified vegetable oils. Bioaugmentation would require obtaining proprietary *dehalococoides* microorganism cultures and would likely speed dechlorination to ethane and reduce the potential for production of vinyl chloride (a PCE and TCE degradation product that is more toxic than PCE and TCE). Additional monitoring wells would be installed to monitor progress as the remedy is implemented. In addition, five sentinel well pairs would be installed along the west side of North 1st Street to monitor groundwater quality approaching the IAWC.

The method of injection would depend on the accessibility of properties in targeted treatment areas. Options for substrate delivery include permanent injection wells and direct-push injection techniques. Direct-push injection would involve the advancement of dozens of boreholes within targeted treatment areas. The sandy soils at the site may limit the utility of direct push injections, and other drilling-injection rigs may be needed to inject amendments to deeper portions of the aquifer. In some cases, directional drilling may need to be used to access target areas under buildings.

Institutional controls would be implemented to prevent human exposure to contaminated groundwater as well as protect the remedy until RGs are attained.

Designing the remedy would require performing pre-design investigations to refine design parameters and a pilot test may also be needed.

Estimated Capital Cost: $2.4 MM
Estimated IC Cost· $21,000
Estimated Annual O&M Cost: $102,000
Estimated Total Present Worth Cost: $4.4 MM
Estimated Construction/Implementation Timeframe: 1 year
Estimated time to Achieve RAOs: 5 years

Alternative GW-4: ISCO or ISCR and ICs

Under this alternative, EPA would treat the contaminant plume through ISCO or ISCR. If ISCR is selected, the chemical used may be one of many proprietary products that combine Zero-Valent Iron (ZVI) or ferrous iron with organic carbon. Institutional controls would be implemented to prevent human exposure to contaminated groundwater until RGs have been attained.

This alternative would destroy most of the source mass through treatment. To reduce dissolved-phase concentrations by at least 50 percent, the source mass is dissolved, sorbed and non-aqueous phases would have to be reduced by more than 50 percent. Institutional controls would prevent human exposure to contaminated groundwater until RGs have been attained. Risk of impact to Terre Haute's wellfield would be minimized by monitoring progress, and making adjustments as necessary to reduce daughter product generation.

Treatment using ISCO or ISCR would be effective for treating discrete areas of contamination and also for possibly providing a treatment barrier upgradient of municipal wells. ISCR may solubilize naturally-occurring arsenic in treatment areas and cause it to migrate slowly downgradient. However, dissolved arsenic would once again return to its insoluble form when it migrates beyond artificially induced reducing zones. ISCO may oxidize arsenic into a less soluble, less mobile state, although this change will likely be temporary, and when the aquifer returns to its normal less oxidized state, arsenic may revert back to its original state.

Based on groundwater flow estimates, it would take approximately 1 to 3 years for the daughter products to reach the wellfield, and it is expected that these compounds would naturally attenuate prior to reaching the wellfield.

Although ISCO and ISCR use opposing chemistries to destroy groundwater COCs, the method of application is similar and, for the purposes of this proposed plan, these two technologies are combined as a single alternative.

ISCO would use strong oxidizing agents such as persulfate or permanganate. For ISCR, the most common amendment is ZVI, which destroys PCE and TCE via reductive dechlorination. The chemical used may be one of many proprietary ZVI products or could be activated carbon impregnated with ZVI.

Designing the remedy would require pre-design investigations to refine design parameters and groundwater chemistry. For example, a pre-design evaluating natural oxidant demand (NOD) to aid in selecting the most cost-effective ISCO/ISCR amendment based on (1) groundwater and soil chemistry, (2) site geology, (3) injection method, and (4) injection ROI for various amendments.

The ISCO or ISCR reagents would be injected via a series of direct push boreholes in the three PCE groundwater plume areas. In addition, a central injection plus 6 step-out injections would be done in the VAS112 area (see FS report for location) to address 1,1,2-trichloroethane, 1,2-dichloropropane, and carbon tetrachloride. The plume area is approximately 1,400 square feet.

Five sentinel well pairs would be installed along the west side of North 1st Street.

Estimated Capital Cost: $913,000
Estimated IC Cost: $21,000
Estimated Annual O&M Cost· $96,000
Estimated Total Present Worth Cost: $2.4 MM
Estimated Construction/Implementation Timeframe: 1 months
Estimated time to Achieve RAOs: 5 years

Alternative GW-5: Pump-and-Treat and ICs

Under this alternative, EPA would actively remediate the entire plume using a pump-and-treat system. *Ex situ* treatment of extracted groundwater may include air stripping or GAC. The representative process option for alternative development is air stripping. Treated water may be discharged by re-injecting it into groundwater or discharging it to the Wabash River. The representative process option for alternative development is discharge to the Wabash River. Institutional controls would be implemented to limit human exposure to contaminated groundwater as well as to protect the remedy until remediation goals are attained.

Groundwater and the contaminant plume would be extracted by pumping wells. The extraction wells would be designed and installed to create a capture zone that would hydraulically contain the entire plume. Over time, groundwater would be cleaned up as contaminated groundwater is extracted, treated, and then re-injected or discharged to the Wabash River. While the remedy is operating, ICs would prevent human exposure to contaminated groundwater. Once groundwater is cleaned up, there would no longer be a threat to the environment. A pump-and-treat system would involve the installation of groundwater extraction wells, conveyance piping, a treatment system, and a treated water discharge system. The number of extraction wells, locations, and flow rates will be refined in the remedial design via groundwater modeling. Air stripping would be the representative process option for treatment. Treated water may be discharged by re-injecting it into groundwater or discharging it to the Wabash River. These discharge options would require the installation of conveyance piping, which would include constructing varying amounts of trenching in streets and public right-of-ways.

Institutional controls would be implemented to limit human exposure to contaminated groundwater as well as protect the remedy until remediation goals are attained.

Designing the remedy would require additional groundwater sampling for water quality parameters, metals, anions/cations, and Langelier saturation index to evaluate the potential for corrosiveness, precipitate/scale formation, and discharge options. Groundwater modeling would be required to design the number, locations, and depths of the extraction wells, and to determine the required flow rates to achieve the desired hydraulic capture and optimize remediation time.

It assumes that four extraction wells would be installed, three within the main PCE groundwater plume, and one at location VAS112. The extracted water would be treated with an air stripper, and no off-gas treatment is necessary. The treated water would be discharged to the river via an outfall meeting the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit.

Five sentinel well pairs would be installed along the west site of North 1st Street.

Estimated Capital Cost: $1.3 MM
Estimated Annual O&M Cost: $200,000 MM
Estimated Total Present Worth Cost. $4.2 MM
Estimated Construction/Implementation Timeframe: 16 months
Estimated time to Achieve RAOs: 10 years

2.10 Comparative Analysis of Alternatives

EPA uses nine criteria to evaluate and compare cleanup alternatives. Each criterion is described below, followed by a discussion of how each alternative meets or does not meet each criterion. More details regarding the evaluation and comparison of the cleanup alternatives against the nine criteria can be found in the 2017 FS Report. In addition, Table 8 and 9 provides a qualitative summary of how each cleanup alternative ranked against each of the nine criteria.

Table 8: Comparison of the Soil Remedial Alternatives against the Nine Criteria

Evaluation Criteria	Soil Alternatives			
	S-1	S-2	S-3	S-4
Overall protection of human health and the environment	□	■	■	■
Compliance with ARARs	N/A	■	■	■
Long-term effectiveness and permanence	□	■	■	■
Reduction of toxicity, mobility, or volume through treatment	□	□	■	□
Short-term effectiveness	■	■	■	■
Implementability	■	■	■	■
Cost	■	■	■	■
State Support/Agency Acceptance	□	■	■	■
Community Acceptance	□	□	□	□
Fully meets criterion ■	Partially meets criterion **□**	Does not meet criterion □		

Table 9: Comparison of the Groundwater Remedial Alternatives against the Superfund Remedy Selection Criteria

Evaluation Criteria	Groundwater Alternatives				
	GW-1	GW-2	GW-3	GW-4	GW-5
Overall protection of human health and the environment	□	**□**	■	■	■
Compliance with ARARs	N/A	■	■	■	■
Long-term effectiveness and permanence	□	■	■	■	■
Reduction of toxicity, mobility, or volume through treatment	□	□	■	■	□
Short-term effectiveness	■	**□**	■	■	■
Implementability	■	■	**□**	**□**	□
Cost	■	■	■	■	■
State Support/Agency Acceptance	□	■	■	■	■
Community Acceptance	□	■	□	□	□
Fully meets criterion ■	Partially meets criterion **□**	Does not meet criterion □			

1. <u>Overall Protection of Human Health and the Environment</u>

The No Action alternative is not protective of human health and the environment because no action would be taken to prevent receptors from contacting or ingesting contaminated soil and groundwater.

The action alternatives would be protective of human health and the environment because actions would be taken to prevent receptors from contacting or ingesting the PAHs and metals contaminants in the soil, either by capping it (Alternative S-2), treating and removing it (Alternative S-3), or removing and capping it (Alternative S-4). Contaminant concentrations in soil and groundwater (by preventing contaminants leaching to groundwater) would decrease.

The action alternatives would be protective of human health and the environment because actions would be taken to prevent receptors from contacting or ingesting the VOCs contaminants in the groundwater, either by treatment (Alternatives GW-3 and GW-4), removal and treatment via air stripping (Alternative GW-5) or monitoring it (Alternative GW-2). Contaminant concentrations in groundwater would decrease.

2. Compliance with ARARs

There are no ARARs that apply to the No Action alternative.

Alternatives S-2, S-3, and S-4 would meet all potential ARARs that would apply to the various technologies or approaches. Contaminated soil removed for disposal would need to be classified so that it could be properly disposed of in a licensed facility.

Alternatives GW-2, GW-3, GW-4, and GW-5 would meet all potential ARARs that would apply to the various technologies or approaches.

3. Long-Term Effectiveness and Permanence

Alternatives S-3 would be the most effective in the long-term because it would treat VOCs as well as permanently remove portions of PAH and metal-contaminated soil above target cleanup levels from the site for disposal offsite.

Alternatives S-2 and S-4 would reduce residual risks, but both alternatives rely on capping of contaminated soil and institutional controls to mitigate exposure to contaminated soil and reduce leaching of contaminants from soil to groundwater. Alternative S-4 would provide better long-term effectiveness than S-2 because a portion of the soil would also be excavated and disposed of off-site. The caps for both of these alternatives would need to be maintained.

Alternatives GW-2, GW-3, and GW-4 would have similar effectiveness, and they would all attain remediation goals, result in the same magnitude of residual risk, and rely on the same controls to limit human exposure to contaminated groundwater. Alternative GW-5 would offer the most robust protection of Terre Haute's wellfield because it will keep the groundwater plume from migrating to the city's wellfield as soon as the pump and treat system becomes operational.

The No Action alternative would not be effective because nothing would be done to address the contaminants in the soil and groundwater.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative S-3 provides treatment of contaminants. VOCs in soil in the targeted SVE areas would be transferred to vapor phase and emitted to the atmosphere using SVE. Alternative S-3 is the only alternative that reduces the toxicity, mobility, or volume of VOCs through treatment of soils.

Alternatives GW-3 and GW-4 would destroy approximately the same mass of source area contaminants through treatment. Alternatives GW-2 and GW-5 would not destroy toxicity or mass through treatment, but ultimately the volume of the groundwater plume would be reduced.

5. Short-Term Effectiveness

Alternatives S-2, S-3, and S-4 would have comparable short-term effectiveness because they would quickly address the immediate risk posed by contaminated soil. Alternative S-2 would only require capping while Alternatives S-3 and S-4 would require excavation. Alternative S-3 would also require the construction of an SVE system while Alternative S-4 would require a cap. Both Alternatives S-2 and S-4 would require less than a year to construct and implement, and Alternative S-3 would take multiple years to construct and implement.

Alternatives GW-3 and GW-4 would have similar short-term effectiveness because they would have similar construction and remedial durations and pose similar risks until remediation goals are attained. Alternative GW-2 would not be effective in the short term, because it will take many years to achieve remediation. Alternative GW-5 would attain remedial action objectives in the short term by minimizing further migration of the contaminant plume.

It is estimated that Alternative GW-2 would take 20 years to attain RGs; Alternative GW-3 would take 5 years; Alternative GW-4 would take 5 years; and GW-5 would take 10 years. GW-5 would take the most time to construct, but provide the most short-term effectiveness.

Alternatives S-1 and GW-1 requires no time to implement and would have no short-term impacts on the site because it includes no construction activities.

6. Implementability

The No Action Alternative is readily implementable because nothing would be done to address soil contaminants.

Alternative S-2 would be the easiest to implement because it would only require installation of capping materials, which are expected to be readily available; however, capping the area on the southeast part of the Gurman facility could be slightly more challenging given the steep slope along the west side of North 3rd Street. Alternatives S-3 and S-4 require an additional amount of coordination and care during design and construction. Alternative S-3 requires excavation of soils in some areas and construction of SVE systems in other areas. The SVE systems would require pilot testing to properly design the systems. Excavation under Alternative S-3 would be conducted near the MTS building and could require shoring to avoid undermining the building foundation. Alternative S-4 would incur some of the same technical challenges associated with capping and excavation, as well as the addition of an excavation area adjacent to the Gurman building, which could require shoring. Alternatives S-3 and S-4 require a borrow source for backfill material; Alternatives S-2 and S-4 require a source for capping materials. Alternatives S-2, S-3, and S-4 would require ICs; alternative S-4 could have it removed once RGs are achieved for groundwater.

Alternative GW-2 would be simple to implement. Alternatives GW-3 and GW-4 for the groundwater plume would require similar skill and effort to construct and would therefore have similar moderate implementability. Alternative GW-5 would take greater effort to construct and operate and would, therefore, be more difficult to implement.

7. Cost

Tables 10 and 11 summarizes the capital, annual operation and maintenance (O&M), and present worth costs for each alternative.

Table 10: Cost Comparison for the Soil Remedial Alternatives

	Alternative	**Capital Cost (in millions)**	**Annual O&M Cost (30 years)**	**Total Present Worth Cost (in millions)**
S-1	No Action	$ 0	$ 0	$ 0
S-2	Capping/ICs	$0.6	$41,000	$1.6
S-3	SVE/Excavation/ Off-site Disposal/ICs	$1.1	$59,000	$1.6
S-4	Capping/Excavation/Off-site Disposal/ICs	$0.8	$34,000	$1.6

Table 11: Cost Comparison for the Groundwater Remedial Alternatives

	Alternative	**Capital Cost (in millions)**	**Annual O&M Cost (30 years)**	**Total Present Worth Cost (in millions)**
GW-1	No Action	$ 0	$ 0	$ 0
GW-2	GW Mon/ICs	$0.2	$65,000	$2.2
GW-3	ERD/ICs	$2.4	$102,000	$4.4
GW-4	ISCO or ISCR /ICs	$0.9	$96,000	$2.4
GW-5	P&T/ICs	$1.2	$207,000	$4.2

8. State Support/Agency Acceptance

IDEM, as the support agency for the Elm Street site, concurred with this ROD on September 20, 2017. The state's concurrence letter will be added to the Administrative Record and is included in Appendix 2.

9. Community Acceptance

Written comments received during the public comment period expressed a preference for Alternatives GW-2, but not S-3. One set of comments preferred S-1 and GW-1, the "No Action" remedies. A full response to public comments is included in this ROD in *Part 3 – Responsiveness Summary.*

2.11 Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 C.F.R. § 300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

The principal threat concept is applied to the characterization of "source material" at a Superfund site. Source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contaminants to groundwater, surface water, or air, or acts as a source for direct exposure. EPA has defined principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. There is no principal threat waste at the Elm Street site.

2.12 Selected Remedy

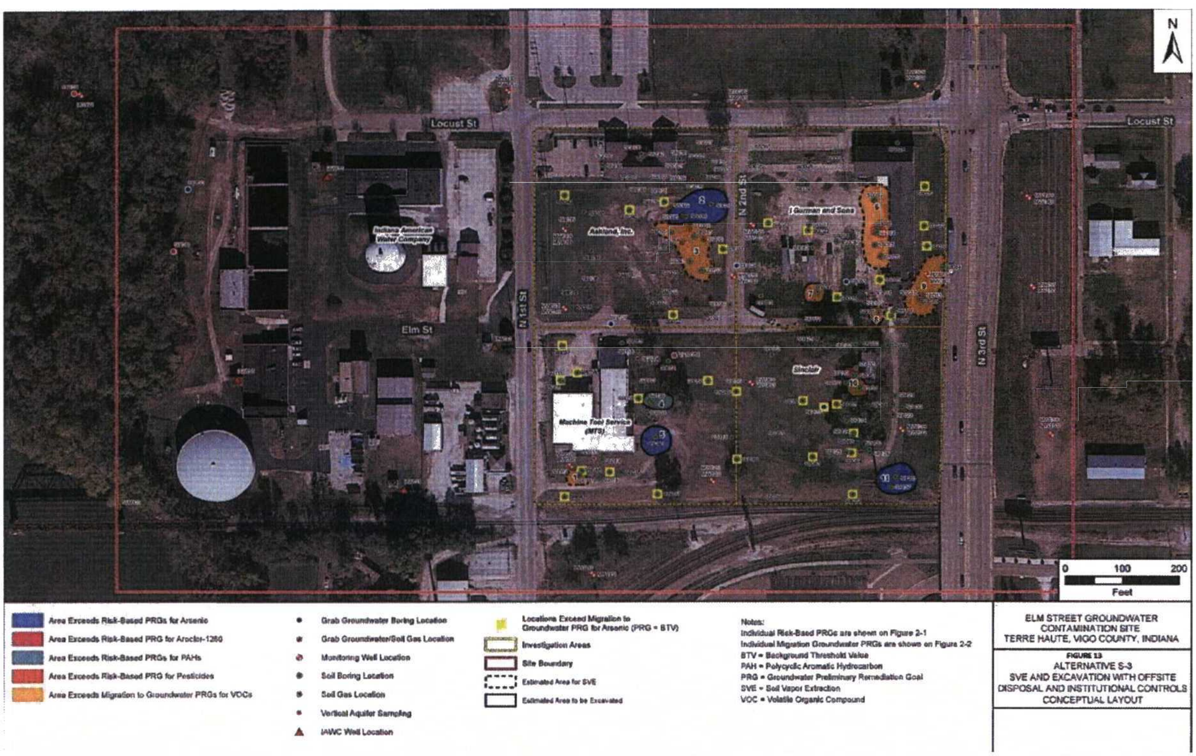
EPA selects Alternatives S-3 (SVE, Soil Excavation with Off-site Disposal, and ICs) and GW-2 (Groundwater Monitoring and ICs) to address the COCs in the Elm Street soil and groundwater.

Description of the Selected Remedy

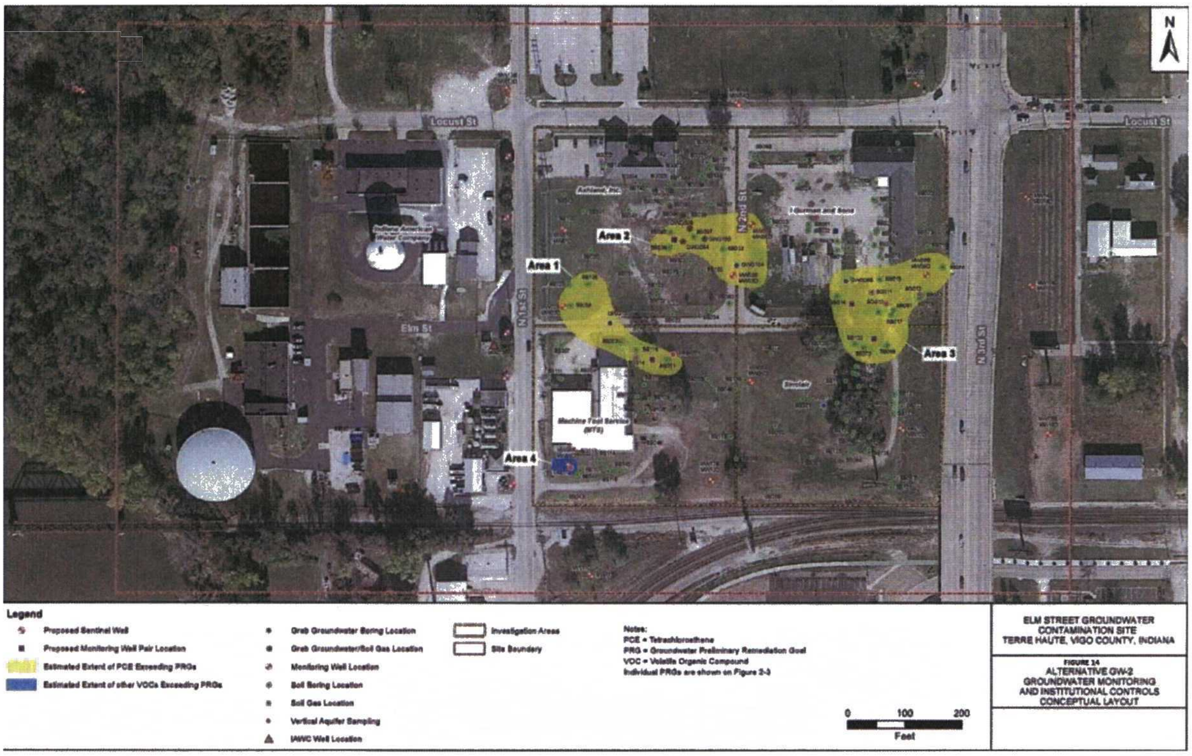
EPA's preferred alternative is Alternative S-3 to address COCs in the Elm Street soils (see Figure 13) and Alternative GW-2 to monitor COCs in the Elm Street groundwater (see Figure 14). EPA proposes to use SVE to treat the VOCs where present in subsurface soil at depths that would make excavation unfeasible. It would also require excavation of shallower accessible contaminated soil (not located under a building foundation) for off-site disposal. Soil excavation would be conducted in designated areas where VOC, arsenic, PAHs, pesticides, and PCB contamination are present with standard excavating equipment. Deeper VOC-contaminated soil would be treated by SVE to reduce contamination to the groundwater. Groundwater monitoring, as an interim measure, would be done until remediation goals are met and to demonstrate the effectiveness of the soil remedy. The preferred alternative's costs, maximum construction timeframes, and maximum time to achieve RAOs are shown below:

Estimated Capital Cost: $1.3 MM
Estimated IC Cost: $21,000
Estimated Annual O&M Cost: $124,000
Estimated Total Present Worth Cost: $3.8 MM
Estimated Construction/Implementation Timeframe: 1 year
Estimated time to Achieve RAOs: 10 – 20 years for soil and groundwater

Figures 13: Soil Areas to be addressed by the preferred alternative



Figures 14: Groundwater Areas to be addressed by the preferred alternative



Rationale for the Selected Remedy

The Selected Remedy was chosen based on EPA's determination that Alternatives S-3 and GW-2 provide the best balance of the evaluation criteria among all of the alternatives. Alternatives S-3 and GW-2 are protective of human health, meet all federal and state ARARs, and meet the RAOs for this proposed remedial action.

In addition, the selected alternative best fulfills the five balancing criteria. With respect to Long-term Effectiveness and Permanence, the preferred alternative will permanently reduce soil contamination at the site. (A future decision document will be developed for the final groundwater alternative.) ICs will prevent exposure to contaminated soil and groundwater until such time that the ICs can be lifted. The selected remedy has virtually the same timeframe to achieve RAOs as Alternatives S-4 and GW-2, but it provides for protectiveness and, in the interim, the ICs will prevent exposure to contaminated soil and groundwater.

The selected alternative uses treatment to reduce the toxicity, mobility, or volume by removing or treating the contaminated soil. The mobility of contaminants is limited through removing highly contaminated surface soil and treating subsurface soil. This should result in also reducing contamination in the groundwater.

The selected alternative will be effective in the short-term. This alternative would protect human health because surface soil posing unacceptable risk would be removed and subsurface soil would be treated. This should result in also reducing contaminants in the groundwater.

All actions in the selected alternative are implementable.

The selected alternative is cost-effective. Alternatives S-3 and GW-2 (SVE, excavation and groundwater monitoring) is more cost effective than Alternatives SW-4 and GW-2 (excavation, capping, and groundwater monitoring) and is a more thorough method of remediating the soil and groundwater.

Expected Outcomes of the Selected Remedy

The Selected Remedy will reduce the risks to human health to levels within EPA's acceptable risk range by removing contaminated surface soil and treating subsurface soil and disposing the contaminated soil off-site. Groundwater contamination, in turn, should be reduced from remediation of the soils. The RAOs for surface soils will be met immediately upon completion of the remedial action construction work. The subsurface soil RAOs will be met in 1-3 years and the groundwater RAOs should be met within a reasonable timeframe after the completion of the remedial action. Soil and groundwater sampling will determine when the remedial goals have been met.

Cost of the Selected Remedy

The estimated cost of implementing the Selected Remedy is $3.8 million. This is based upon anticipated capital costs of $1.3 million and annual operation and monitoring costs of $124,000. The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

2.13 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

Protection of Human Health and the Environment

The Selected Remedy Alternatives S-3 and GW-2, provide overall protection of human health from impacted soils and groundwater. The Selected Remedy will meet RAOs and protect human health by preventing exposure to impacted soil through removal and treatment of site contaminants.

The maximum current potential human health risks associated with soil exceed the target levels of acceptable risk at the site. The Selected Remedy will reduce the cancer risks from their current levels to 1×10^{-6} and the non-cancer Hazard Index to less than 1. There are no short-term threats associated with the Selected Remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy is expected to comply with the state and federal ARARs that are specific to this remedial action. The federal and state ARARs for this action are listed in Appendix 3.

Cost-Effectiveness

In EPA's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (40 C.F.R. § 300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated present worth cost of the Selected Remedy is $3.8 million. Removing all the contaminated surface soil and treating the subsurface soil will be the most protective of human health. Capping the soil will still require maintenance to ensure the remedy is working and is essentially the same cost. The Selected Remedy is a permanent solution for soil contamination and an interim solution for groundwater contamination and will not require maintenance after the remedial goals have been met.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable/Preference for Treatment as a Principal Element

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering state and community acceptance.

The Selected Remedy satisfies the criteria for long-term effectiveness by removing contaminated surface soil and treating subsurface soil from the site and replacing the surface soil with clean soil. The Selected Alternative for this decision utilizes treatment to reduce the toxicity, mobility, or volume of the contaminants in soil. However, the interim selected remedy for groundwater does not destroy toxicity or mass through treatment, but ultimately the volume of the groundwater plume would be reduced.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants being excavated and removed off-site as well as treatment of the contaminants, there will be no requirement to conduct FYRs after the soil and groundwater RGs have been met. If the RGs are met, the site should meet the requirements of UU/UE, which means that restrictions on the land or other natural resources will not be necessary.

2.14 Documentation of Significant Changes

EPA released the Proposed Plan for the Elm Street Superfund site for public comment on August 7, 2017. The Proposed Plan identified Alternative S-3 and GW-2 as the preferred alternative. The Proposed Plan public comment period ran from August 7, 2017, through September 6, 2017. CERCLA Section 117(b) and 40 C.F.R. § 300.430(f)(5)(iii) require an explanation of any significant changes from the remedy presented in the Proposed Plan that was published for public comment. Based upon its review of the written comments submitted during the public comment period, EPA has determined that no significant changes to the remedy are necessary or appropriate.

Part 3 – Responsiveness Summary

In accordance with CERCLA Section 117, 42 U.S.C. §9617, EPA released the Proposed Plan and Administrative Record on August 7, 2017, and the public comment period ran through September 6, 2017, to allow interested parties to comment on the Proposed Plan.

This Responsiveness Summary provides both a summary of the public comments EPA received regarding the Proposed Plan and EPA's response to those comments. EPA received three sets of written comments (via regular mail and email) during the public comment period, two were supportive of the groundwater monitoring and ICs proposed interim remedy, but were not supportive of the soil remedy. One set of comments proposed the 'No Action' remedies for soil and groundwater. A copy of the comments received is included in the Administrative Record for the site. The Administrative Record index is attached as Appendix 2 to this ROD. EPA, in consultation with IDEM, carefully considered all of the information in the Administrative Record prior to selecting the remedy documented in this ROD. Complete copies of the Proposed Plan, Administrative Record, and other pertinent documents are available at the Vigo County Public Library, 1 Library Square, Terre Haute, Indiana and at the EPA Region 5 Superfund Division Records Center, 77 West Jackson Boulevard, 7th floor, Chicago, Illinois.

Comments from the Community:

Comment 1: The Risk Assessment Should Have Been Updated as part of the Finalization of the FS.

Response: This comment relates to carcinogenic PAH risk numbers being updated between the time of finalization of the risk assessment and the Proposed Plan. The PRGs developed in the Proposed Plan used the updated risk numbers for carcinogenic PAHs.

Comment 2: Commercial/Industrial Land Use is the Current and Ongoing Land Use and Remedial Requirements Should be Determined on the Basis of this Land Use.

Response: EPA disagrees. It is a reasonable determination that future land use could be residential. Currently, a residential apartment complex exists adjacent to the site. EPA's policy is to identify all potentially exposed populations.

Comment 3: The Consideration of a Low-Density Residential Scenario for the Determination of Remedial Requirements is Not Appropriate.

Response: EPA disagrees. It is a reasonable determination that future land use could be residential. Currently, a residential apartment complex exists adjacent to the site. EPA's policy is to identify all potentially exposed populations.

Comment 4: The Background Assessment of Soil Requires More Work.

Response: EPA disagrees. The background assessment is complete for this site. For example, the excavation of arsenic is proposed based on a soil PRG (30 mg/kg) calculated using a target risk of 1 x 10-5. This arsenic PRG (30 mg/kg) is almost four times greater than the site-specific background threshold value (BTV) of 7.2 and 7.6 for surface and subsurface soil, respectively. It is also about double the alternate arsenic background concentration of 14 mg/kg mentioned in the comments. Additional background investigation is unlikely to result in a site-specific background concentration of arsenic greater than or equal to the proposed arsenic soil PRG.

Comment 5: Leaching of Metals and PAHs to Groundwater is not a Driver for Remediation at this Site.

Response: VOCs, hazardous substances, were the primary driver for IDEM's MTG PRGs. As discussed on page 23 of the Proposed Plan, metals were not carried forward since they were ubiquitous. PAHs were not considered for developing PRGs for IDEM's MTG PRGs.

Comment 6: Assessment of Potential Leaching to Groundwater is Generic and Not Appropriate for the Assessment of Remedial Requirements.

Response: EPA disagrees. The assessment of potential leaching to groundwater is appropriate. The presence of VOCs exceeding MTG values in both shallow and deep soil, as well as, VOCs exceeding PRGs in groundwater underlying the same areas indicates downward vertical migration of VOCs through the soil column to groundwater at the Gurman, MTS, and Valvoline properties. Exposure to certain VOCs causes damage to the kidney, liver, and central nervous system as well as can cause cancer in animals and humans. Furthermore, the VOCs had an impact on operations at the city of Terre Haute's only drinking water supply.

Comment 7: The Assessment Methodology Used to Assess Vapor Flux from Groundwater is Overly Conservative and Not Reflective of Site Conditions.

Response: EPA disagrees. The Vapor Intrusion Screening Levels (VISL) model is used to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. This data shows that vapor intrusion is likely to occur at the identified areas at the site.

Comment 8: Scope for SVE Activities is Overly Complicated and Pilot Testing is not Required in this Setting.

Response: The scope of SVE activities and pilot testing will be determined during the remedial design phase of this project. SVE is a common remediation method, including pilot testing.

Comment 9: For the soil cleanup alternative, I vote for the S-1 option. For the groundwater cleanup alternative, I vote for GW-1. The areas of concern for contamination are now dormant and will improve in time.

Response: EPA disagrees. The "No Action" remedies are not protective of human health and active remediation needs to be implemented at the site.

Comments on the Elm Street Groundwater Contamination Superfund Site Specifically on the Ashland (Valvoline) Property

Comment 1: U.S. EPA considers excess lifetime cancer risks (ELCRs) at or below 1 x 10^{-4} to be acceptable and not require remediation. The non-cancer hazard index (HI) equal to 1 also does not require remediation. Therefore, any exposure pathways with risks that are below this target risk or hazard level should be excluded from further evaluation.

Response: EPA evaluates ELCRs in the risk range of 1 x 10^{-6} to 1 x 10^{-4}. Sites which fall in this risk range are not necessarily "clean" and further evaluation may be warranted under the Superfund program. This is the case at the Elm Street Groundwater Contamination site. EPA develops PRGs for establishing site-specific cleanup levels. Aggregate exposures below an HI of 1 derived using target organ specific hazard quotients likely will not result in adverse non-cancer health effects over a lifetime of exposure and would ordinarily be considered acceptable.

Comment 2: The HHRA relies on outdated toxicity values for benzo(a)pyrene and the benzo(a)pyrene equivalents. In January 2017, U.S. EPA revised the cancer slope factor and inhalation unit risk for benzo(a)pyrene. The updated values reduce the risk by a factor of approximately 7. The HHRA should be revised to incorporate current toxicity values and the remedial alternatives should then be re-evaluated based on the updated risk assessment calculations before any remedy decision is made.

Response: This comment relates to carcinogenic PAH risk numbers being updated between the time of finalization of the risk assessment and the Proposed Plan. The PRGs developed in the Proposed Plan used the updated risk numbers for carcinogenic PAHs.

Comment 3: The soil and groundwater regional screening levels (RSLs) used to identify constituents of potential concern (COPCs) on the Valvoline Property are out-of-date. U.S. EPA updated is RSL calculator in January 2017 and formally released the new RSLs in June 2017. The HHRA should be revised to incorporate U.S. EPA's current screening levels in the risk assessment.

Response: EPA disagrees. It is a reasonable determination that future land use could be residential. Currently, a residential apartment complex exists adjacent to the site. EPA's policy is to identify all potentially exposed populations.

Comment 4: Significant soil removal occurred at the Valvoline Property in 2013, but it is unclear from the HHRA report whether this remedial work was appropriately considered in U.S. EPA's risk calculations. To the extent that the risk assessment was based on pre-excavation sampling data and/or failed to incorporate more recent post-excavation sampling data, then the assessment does not accurately reflect current site conditions at the Valvoline Property, and the HHRA should be revised before any remedial alternative is selected for the Property.

More generally, the data used to calculate the exposure point concentrations (EPCs) are included in the Appendix together with the ProUCL output. However, the sample IDs are not included, which precludes verifying the sample locations. The HHRA should be revised to include complete data tables with sample identifications.

Response: Results associated with excavated soil area at Ashland were removed from the database and were not considered in the risk assessment. The input files included in the HHRA were to allow readers to replicate the ProUCL statistics, if they chose. All soil statistics for Ashland were generated using the remaining soil analytical results after removal of the excavate soils results.

Comment 5: Ingestion of homegrown produce drives the results of the soil risk assessment at the Valvoline Property, but as discussed further in Comment 7, below, this not a reasonably foreseeable future used of the Property. Further, the EPC for trichloroethene (TCE), one of the risk drivers for this theoretical pathway, is based on the maximum detected concentration, which itself is an unrealistic and overly conservative exposure scenario. If this pathway is excluded, then the potential soil risks would be below U.S. EPA's 1 x 10^{-4} target risk and thus would present an acceptable risk. Likewise, the non-cancer hazards would be significantly reduced. Reviewing Table 9.7.2.2 from the HHRA, if the non-cancer hazards for soil exposure were evaluated by target organ, the individual target organ HIs would be less than or equal to the benchmark of 1.

Resident	**Risk/Hazard including Ingestion of Homegrown Produce**	**Risk/Hazard excluding Ingestion of Homegrown Produce**
RME – surface soil	1.3 x 10^{-3} / 110	7.8 x 10^{-5} / 2
RME – subsurface soil	4.5 x 10^{-4} / 33	3.9 x 10^{-5} / 2

Response: EPA disagrees. It is a reasonable determination that future land use could be residential. Currently, a residential apartment complex exists adjacent to the site. EPA's policy is to identify all potentially exposed populations.

Comment 6: In 2013, Valvoline conducted a voluntary soil excavation and removed approximately 211 tons of shallow soils from the Valvoline Property. Thereafter, Arcadis completed 19 soil borings to characterize the lateral and vertical extent of any remaining soil impacts after excavation. As detailed in the conclusions of the March 2014 Ashland Parcel Voluntary Remedial Investigation Report, "a preliminary risk evaluation was completed to assess the potential future risk for migration of volatile organic compounds (VOCs) in soil to groundwater. The results of the evaluation demonstrate that following the voluntary removal of impacted soils, remaining site-wide 95% upper confidence levels (UCLs) for tetrachloroethene (PCE) and TCE do not exceed the adjusted RSLs and Indiana Department of Environmental Management (IDEM) criteria. No additional remedial actions on the Ashland property are warranted."

As noted in Comment 4 above, it is unclear whether the HHRA and, by extension, the Proposed Plan, incorporated and properly considered this removal work when evaluating the need for potential additional soil remediation at the Valvoline Property. U.S. EPA should clarify the record on this point, and to the extent that these activities and their impact on site conditions were not appropriately considered, then the risk assessment should be revised and potential remedial alternatives for the Valvoline Property reassessed.

Response: Results associated with excavated soil area at Ashland were removed from the database and were not considered in the risk assessment. Further, the voluntary removal did not evaluate arsenic contamination.

Comment 7: Commercial/industrial land use is the long-standing land use at the Valvoline Property, and the use of a low-density residential screening scenario (including consumption of homegrown produce) is not appropriate considering the current and reasonably expected future site usage. Further, even if low density residential and consumption of homegrown produce were appropriately retained as screening criteria, then institutional and/or passive engineering control(s) could be used to more effectively define and limit future site usage and to eliminate any potential future exposure pathways. These controls include deed restrictions, a surface cap if appropriate (e.g., a parking lot or slab), etc. (See Comment 9, below.)

Response: EPA disagrees. It is a reasonable assumption that future land use could be residential. Further, EPA prefers treatment remedies. A cap over the soil will require maintenance in perpetuity. The Proposed Remedy of excavation, SVE, excavation and off-disposal is expected to allow unlimited use/unlimited exposure (UU/UE) for this site in the future.

Comment 8: Figure 1-25 from the May 2017 Final Remedial Alternatives Screening Technical Memorandum indicates that only two surface soil samples at the Valvoline Property exceed the industrial/commercial screening levels for VOCs and SVOCs. Further, those two samples would fall within acceptable risk range if U.S. EPA were to evaluate the potential risk using U.S. EPA's most current toxicity values for benzo(a)pyrene. (See Comment 2, above). The Proposed Plan, specifically Tables 1 and 2, should be revised to reflect that no industrial and/or commercial RSLs were exceeded for benzo(a)pyrene on the Valvoline Property.

Response: This comment relates to carcinogenic PAH risk numbers being updated between the time of finalization of the risk assessment and the Proposed Plan. The PRGs developed in the Proposed Plan used the updated risk numbers for carcinogenic PAHs.

Comment 9: Figure 1-27 from the July 2017 Final Feasibility Study indicates that arsenic is above the U.S. EPA residential and industrial soil RSLs, which correspond to a target risk of 1×10^{-6} and a non-cancer hazard quotient (HQ) of 1. Expanding the target risk range to the fullest extent (i.e., 1×10^{-4}) and the non-cancer HQ to 1, the U.S. EPA residential soil RSL could be set at 300 mg/kg (corresponding to a risk of 1×10^{-4} and a non-cancer HQ of 0.6). Based on site data, there is only one soil sample in excess of 35 mg/kg and no soil samples in excess of 300 mg/kg on the Valvoline Property. Further, as discussed in other comments, institutional controls can be used to limit future residential use. Therefore, arsenic should not be considered a primary soil contaminant for the Valvoline Property, as concluded in the Final Feasibility Study.

Response: Page 22 of the Proposed Plan states that arsenic was set at the 1×10^{-5} risk level and not at a 1×10^{-6} risk level. Arsenic is a COC in soils. Numerous health effects in humans have been documented after short-term exposure to arsenic. These include edema, conjunctivitis, liver enlargement, irritation of the mucous membranes, and gastrointestinal problems such as vomiting, diarrhea, cramps, and pain.

Comment 10: In reviewing the soil data associated with Figure 9 from the Proposed Plan, which shows the proposed area for SVE on the Valvoline Property, only two of the 14 discrete intervals are near groundwater movement (SB95-ASH-040-140415 and SB97-ASH-040-140415). (This is based on a review of data in Table A-1 from the Final Remedial Investigation Report, Revision 2, in conjunction with Figure 2-2 from the May 2017 Final Remedial Alternatives Screening Technical Memorandum, where soil borings SB093, SB095, SB097, and BS102 are indicated to be the soil sample locations exceeding migration-to-groundwater PRGs for VOCs. U.S. EPA then used those soil borings to determine the extent of the proposed soil remedy (S-3), which includes SVE for VOC remediation.) The other soil samples in the proposed SVE area are shallower, and geologic features present on-site (silt, clay, and organic fractions) act to inhibit migration vertically downward.

For example, the value called out as the maximum value for TCE in Table 3 of the Proposed Plan was from an isolated soil sample at SB097B (0-2 feet interval). A surface soil sample does not realistically represent a migration-to-groundwater concern when the depth to groundwater is approximately 40 feet below ground surface.

Given that only two soil sample intervals have the potential to be in contact with the groundwater table and the limited extent of impacts, an active remedy designed to address migration-to-groundwater is not warranted at the Valvoline Property. Instead, the data support the use of deed restrictions and/or a surface cap (if deemed appropriate), as a more feasible, cost-effective solution that would remain protective of human health and the environment.

Response: EPA disagrees. The assessment of potential migration to groundwater was appropriate. The presence of VOCs exceeding MTG values in both shallow and deep soil, as well as, VOCs exceeding PRGs in groundwater underlying the same areas indicates downward vertical migration of VOCs through the soil column to groundwater including the Valvoline property. Exposure to certain VOCs causes damage to the kidney, liver, and central nervous system as well as can cause cancer in animals and humans. Furthermore, the VOCs had an impact on operations at the city of Terre Haute's only drinking water supply.

Comment 11: The groundwater data supports the conclusion that SVE is not an appropriate remedy at the Valvoline Property. Figure 1-44 from the May 2017 Final Remedial Alternatives Screening Technical memorandum indicates that VOC exceedances of residential criteria in monitoring wells on the Valvoline Property is limited to one constituent (PCE) and one upgradient monitoring well (MW03S). The other four monitoring wells closer to the downgradient property boundary (two shallow and two deep) are below screening levels for all COPCs.

The most recent data collected from MW03S was in 2015 (two years after Valvoline's voluntary soil excavation efforts), and demonstrates that the PCE concentration in the well has been relatively stable and consistent over time (6.8-7.6 μg/l, based on samples between 2009 and 2015). Additionally, the voluntary soil removal activities have not materially affected the concentrations at the adjacent shallow monitoring well, demonstrating that the potential for migration to groundwater residual VOC soil impacts is negligible (especially after removal of surface structures and historic soils, which typically results in groundwater concentration increases due to increased infiltration).

The stability in groundwater concentrations at a shallow monitoring well adjacent to the excavation (pre- and post-excavation), combined with other monitoring well data below screening levels, supports the conclusion that a soil remedy targeted to address a migration-to-groundwater condition that is not supported by the site data is not appropriate at the Valvoline Property.

Response: SVE is an appropriate remedy at the Valvoline Property. EPA prefers treatment remedies. A cap over the soil will require maintenance in perpetuity. The Proposed Remedy of SVE is expected to allow unlimited use/unlimited exposure (UU/UE) at the site in the future.

Comment 12: If SVE is selected for the Valvoline Property notwithstanding the above comments, then the system should be property specific. Due to the disparate nature and extent of impacts identified at the Elm Street Superfund Site, individually tailored SVE systems will be more effective and implementable than one large system servicing multiple properties.

Response: The specific details of the SVE system will be determined during the remedial design phase of this project. EPA agrees that the SVE system needs to be effective and implementable.

Appendix 1 – Administrative Record

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
ELM STREET GROUNDWATER CONTAMINATION SITE
TERRE HAUTE, VIGO COUNTY, INDIANA

ORIGINAL
AUGUST 2, 2017
SEMS ID: 935226

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	264439	9/12/88	Indiana Department of Natural Resources	File	Screening Site Inspection for I Gurman & Sons Inc.	247
2	264451	9/12/88	Indiana Department of Natural Resources	File	Screening Site Inspection Report for Machine Tool Service	484
3	935225	10/1/88	File	File	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final, OSWER Directive 9355 3-01	186
4	264441	8/19/89	Indiana Department of Natural Resources	File	Screening Site Inspection Report for BI State Products	190
5	486078	2/15/90	Giles Engineering Associates	Duffy, M., Ashland Petroleum Co.	Geotechnical Exploration and Preliminary Petroleum Hydrocarbon Presence Study	14
6	479142	6/11/01	Spicuzza, J., Ashland Inc.	Molini, R., IDEM	Letter re: Draft Expanded Site Inspection Report	5
7	264440	6/15/02	Indiana Department of Natural Resources	File	Expanded Site Inspection Report for I Gurman & Sons Inc.	386
8	264442	6/15/02	Indiana Department of Natural Resources	File	Expanded Site Inspection Report for BI State Products	387
9	479141	6/20/02	Molini, R., IDEM	Pels, J., U.S. EPA	Letter re. BiState Products	22

10	479148	5/5/03	Boenzi, F., U.S. EPA	Dababneh, F., U.S. EPA, et al.	Email re· Trip Report for I. Gurman & Bi-State Sites	3
11	264443	7/15/03	Indiana Department of Natural Resources	File	Expanded Inspection Report for Machine Tool Service	480
12	932566	11/20/03	Perry, J., Machine Tool Service	Cuffman, C., U.S. EPA	104(E) Response - Machine Tool Service Inc (MTS) ***(Redacted)***	189
13	479126	12/9/03	Crossroads Court Reporting	U.S EPA	Transcript of Proceedings re: BiState Products Site V-W-04-C-770	134
14	486088	8/16/04	Perry, F., Machine Tool Service	File	Letter re: Refutation of Non-Compliance with 104(E) Request (W/Certified Mail Receipt of Letter Dated Dec 15, 2003, Delivered 12/22/2003)	2
15	932567	8/20/04	Perry, F., Machine Tool Service	File	Letter re· Request for Information, Re-Submitted (W/Attachments) ***(Redacted)***	22
16	512415	10/5/04	Techlaw Inc.	U S EPA	Title Search Report for Machine Tool Service Site	233
17	479143	10/20/04	Kaplan, L., IDEM	Mathur, B., U.S. EPA	Letter re· Aggregation and Designation of I. Gurman & Son, BiState Products, and Machine Tool Services as a Superfund Alternative Site	2
18	479144	1/26/05	Sleboda, J., U.S EPA	File	Memo re. Decision to Move Forward with Bi-State Products, Machine Tool Services and I. Gurman and Sons Superfund Alternative Sites Collectively	2
19	479138	4/14/05	Carney, W., U.S. EPA	Lampkin-Isabel, R., Ashland Inc., et al.	General Notice Letter for the Bi-State Products Site	12
20	932565	5/9/05	Lampkin-Isabel, R., Ashland Chemical Co.	Toney, M., U.S. Dept of Justice	Letter re: General Notice Letter and Potential for Superfund Alternative Site Approach ***(Redacted)***	1
21	479139	8/26/05	Carney, W., U.S. EPA	Lampkin-Isabel, R., Ashland Inc., et al	Special Notice Letter for Elm Street Groundwater Contamination Site	21

22	479121	11/3/05	Lampkin-Isabel, R., Ashland Inc.	Sleboda, J., U S. EPA	Special Notice Letter for Elm Street Groundwater Contamination Site- Terre Haute, Vigo County, Indiana	2
23	479122	12/13/05	Lampkin-Isabel, R., Ashland Inc.	Olson, E., U S. EPA	Special Notice Letter for Elm Street Groundwater Contamination Site- Terre Haute, Vigo County, Indiana	4
24	479120	12/14/05	Intermill, A., Bose, McKinney, & Evans, LLP	Olson, E., U.S EPA	Letter re. Machine Tool Service, Inc.- Elm Street Groundwater Contamination Site	4
25	479118	12/15/05	Schopmeyer, G., Kahn, Dees, Donovan, & Kahn, LLP	Olson, E., U.S EPA	Special Notice Letter for Elm Street Groundwater Contamination Site- Terre Haute, Vigo County, Indiana	2
26	479119	12/16/05	McHugh, L., Barnes & Thornburg	Olson, E., U.S EPA	Special Notice Letter for Elm Street Groundwater Contamination Site	1
27	479124	2/10/06	Carney, W., U.S. EPA	Multiple Addressee	Letter re: Notice of Termination of Negotiations	7
28	479134	3/1/06	Draugelis, A., U.S. EPA	Sleboda, J., U.S. EPA	Email re: Vapor Intrusion Model	1
29	479140	5/12/06	Easterly, T., IDEM	Mathur, B., U.S. EPA	Letter re: Proposed Inclusion of the Elm Street Groundwater Contamination Site	9
30	479117	6/19/06	Schopmeyer, G., Kahn, Dees, Donovan, & Kahn, LLP	Olson, E., U.S. EPA	Letter re: Elm Street Groundwater Contamination Site, Terre Haute, Vigo County, IN	31
31	479123	11/5/07	Carney, W., U.S. EPA	Lampkin-Isabel, R., Ashland Inc., et al	Special Notice Letter for Elm Street Groundwater Contamination Site- Terre Haute, Vigo County, Indiana (With attachments)	138
32	479132	1/23/08	McHugh, L., Barnes & Thornburg	Olson, E., U.S. EPA	Special Notice Letter for Elm Street Groundwater Contamination Site- Terre Haute, Vigo County, Indiana	3
33	291672	2/14/08	Carney, W., U.S. EPA	Multiple Addressee	Letter re: Notice of Termination of Negotiations	2
34	479125	2/22/08	Carney, W., U.S. EPA	Abner, D., Ashland Inc., et al.	Letter re: Notice of Termination of Negotiations	2

35	479116	7/8/08	U.S. EPA	File	Site Visit Summary	3
36	479133	7/28/08	Olson, E., U.S. EPA	Intermill, A., Bose McKinney & Evans	Letter re: Elm Street Groundwater Contamination Site	2
37	479136	8/13/08	Agency for Toxic Substances and Disease Registry	File	Health Consultation for Elm Street Groundwater Contamination	51
38	479115	6/9/09	Caine, H., U S. EPA	Storey Oil Company	Letter re: Surface Soil Sampling/Subsurface Soil Sampling/Groundwater Sampling	3
39	479135	7/15/09	Malone, B., SulTRAC	Caine, H., U.S. EPA	Revised Sampling and Analysis Plan for the Elm Street Groundwater Contamination Site	209
40	479150	10/13/09	McHugh, L., Barnes & Thornburg	Olson, E., U.S. EPA	Letter re: Elm Street Groundwater Contamination Site	17
41	479131	11/20/09	Olson, E., U.S. EPA	McHugh, L., Barnes & Thornburg	Letter re: Elm Street Groundwater Contamination Site	1
42	479130	11/24/09	McHugh, L., Barnes & Thornburg	Olson, E., U.S. EPA	Letter re: Elm Street Groundwater Contamination Site	1
43	365921	4/21/10	URS	Olson, E., U.S. EPA	Remedial Investigation Report	854
44	479145	9/1/10	Nebelsick, J., U.S EPA	Layne, W., U.S. EPA	Email re: Elm Street Groundwater Contamination Site Request	3
45	479146	10/7/10	Roach, S., Ashland Inc.	Caine, H., U.S. EPA	Letter re: Elm Street Groundwater Contamination Site	2
46	479129	11/5/10	Caine, H., U.S. EPA	Roach, S., Ashland, Inc.	Letter re. Response to Inquiry	2
47	479128	11/26/10	Olson, E., U.S. EPA	Roach, S., Ashland, Inc.	Letter re: Elm Street Groundwater Contamination Site	3
48	928412	11/29/10	SulTRAC	U.S. EPA	Data Validation Summary Report- Phase I Remedial Investigation Sampling Results	607
49	928415	11/29/10	SulTRAC	U.S. EPA	Data Evaluation Summary Report	219

50	479113	12/15/10	Malone, B , SulTRAC	Caine, H., U.S. EPA	Letter re: Additional Samplıng to Confirm Phase I RI Analytical Results	2
51	516240	12/17/10	U.S. EPA	File	Data Quality Evaluation Guidelines for Ambient Aır Acroleın Measurements	4
52	516239	1/21/11	State of Michigan Department of Community Health	Keeslar, F., Grand Traverse County Health Department	Letter re: Environmental Data for the Grand Traverse Overall Supply (GTOS)	14
53	479149	1/25/11	Draugelis, A., U.S. EPA	Caine, H., U.S. EPA	Email re: Elm Street GW Contamination Sıte	22
54	414530	1/19/12	SulTRAC	U.S. EPA	Final Phase I Data Evaluation Summary Report	259
55	479114	4/3/12	Huxhold, J., IDEM	Caine, H , U.S. EPA	Letter re: Phase II Fıeld Sampling Plan	1
56	479152	5/2/12	Caıne, H., U.S. EPA	Storey, M., Storey Oil Company	Letter re Phase I Data Evaluation Summary Report (With Attached Access Agreement)	2
57	479112	5/25/12	Prendiville, T , U.S. EPA	Caıne, H , U.S EPA	Memo re: Conditional Approval for the Initıal Revision of the Quality Assurance Proȷect Plan (QAPP)	2
58	928413	8/21/12	SulTRAC	U.S. EPA	Field Sampling and Analysis Plan for the Elm Street Groundwater Contamination Site (With QAPP and HASP Attached)	540
59	928416	1/4/13	Malone, B., SulTRAC	Caine, H., U.S. EPA	Data Validation Summary Report- Phase II Remedial Investigation Multimedia Sampling Results	356
60	479110	4/25/13	Roach, S., Ashland Inc.	Caine, H., U.S. EPA	Email re Notice- Demolition Activitıes at Ashland's Former Elm Street Facility Located in Terre Haute, IN	1
61	479127	7/3/13	Fliss, J., IDEM	Caıne, H., U.S. EPA	Letter re: Phase II Data Evaluation Summary Report	2
62	928410	9/25/13	SulTRAC	U.S EPA	Phase II Data Evaluation Summary Report	372

63	928414	3/1/14	Arcadis	Ashland Inc	Ashland Parcel Voluntary Remedial Investigation Report	125
64	479151	4/18/14	Caine, H., U S. EPA	Brenneman, C., Indiana American Water, et al.	Letter re: Phase II: Data Evaluation Summary Report	26
65	479111	10/21/14	Malone, B , SulTRAC	Caine, H., U S. EPA	Phase II Remedial Investigation Sampling and Analysis Plan (SAP) Addendum for the Elm Street Groundwater Contamination Site	146
66	479109	11/13/14	Kasarabada, P., IDEM	Caine, H., U.S. EPA	Letter re: Elm Street Groundwater Contamination Site	1
67	479108	11/26/14	Roberman, A., U.S. EPA	Caine, H., U.S. EPA	Memo re: Approval for the Initial Revision of the Quality Assurance Project Plan (QAPP) for the Elm Street Groundwater Contamination Site	1
68	479147	3/31/15	Caine, H., U.S. EPA	Brenneman, C., Indiana American Water, et al	Letter re: Phase II Resampling Mobilization	14
69	932601	6/1/15	U.S. EPA	File	OSWER Technical Guide for Assessing and Monitoring Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER Publication 9200.2-154	267
70	516228	7/25/16	Roach, S., Ashland Inc.	Olson, E., U.S. EPA	Letter re: Project Transfer	2
71	934496	12/2/16	SulTRAC	U.S. EPA	Final Revision 2 - Remedial Investigation Report for Elm Street Groundwater Site (Attached with cover letter)	3082
72	516223	5/5/17	SulTRAC	U.S. EPA	Final Remedial Alternatives Screening Technical Memorandum	197
73	516233	7/20/17	SulTRAC	U.S. EPA	Final Feasibility Study - Elm Street Groundwater Contamination Site (Attached with Cover Letter)	342
74	516238	7/25/17	Caine, H., U S EPA	Lifka, J., SulTRAC	Letter re: Approval of Final Remedial Investigation Report Revision 2 and Feasibility Report	1

75	935219	8/14/17	U.S. EPA	File	Proposed Plan - Elm Street Groundwater Contamination Superfund Site	40

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
ELM STREET GROUNDWATER CONTAMINATION SITE
TERRE HAUTE, VIGO COUNTY, INDIANA

UPDATE 1
SEPTEMBER 13, 2017
SEMS ID: 936155

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	531487	8/21/17	Owens, J , Spencer/Banks, Inc	U.S EPA	EPA - Public Comment Sheet	2
2	531488	9/6/17	Campbell, K., Manko, Gold, Katcher & Fox LLP	Allen, C., U.S EPA	Letter re: Comments on Proposed Plan for Elm Street Groundwater Contamination Superfund Site, Terre Haute, Indiana (With Attachment)	6
3	531489	9/6/17	Goulding, N., EHS Support	Allen, C., U S. EPA	Letter re Comments on Proposed Plan for Elm Street Groundwater Contamination Superfund Site	20
4	531486	9/12/17	Caine, H , U.S. EPA	File	Memo re: Feasibility Study Updated Figures - Elm Street Groundwater Contamination Site - Terre Haute, Indiana	5

Appendix 2 – Indiana Department of Environmental Management Concurrence Letter

IDEM

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We Protect Hoosiers and Our Environment.

100 N. Senate Avenue • Indianapolis, IN 46204

(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Bruno L. Pigott
Commissioner

September 20, 2017

Mr. Howard Caine
U.S. EPA Region 5
77 West Jackson Boulevard
Mail Code SR-6J
Chicago, Illinois 60604-3507

Dear Mr. Caine:

Re: Proposed Plan for a
Record of Decision (ROD)
Elm Street Superfund Site #7500098
Terre Haute, IN

The Indiana Department of Environmental Management (IDEM) has reviewed the U.S. Environmental Protection Agency's ROD Amendment for the Elm Street Superfund site. IDEM is in full concurrence with the major components of the selected remedy outlined in the document, which include:

1. Soil vapor extraction (SVE) and excavation of soil in combination with off-site disposal and institutional controls (ICs)

2. Groundwater monitoring and ICs

IDEM staff agree that the selected remedies are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and are cost-effective. IDEM staff have been working closely with Region V staff in the selection of appropriate remedies and is satisfied with the selected alternatives.

Please be assured that IDEM is committed to accomplish cleanup at all Indiana sites on the National Priorities List and intends to fulfill all obligations required by law to achieve that goal. We look forward to beginning work on this project.

Sincerely,

Peggy Dorsey
Assistant Commissioner
Office of Land Quality

PD:DW:tr
cc: Bruce Oertel, IDEM
Rex Osborn, IDEM
Daniel Walterman, IDEM

Appendix 3 – Applicable or Relevant and Appropriate Requirements

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
SAFE DRINKING WATER ACT OF 1974 (42 U.S.C., ch. 6A, § 300[f]–300[j]-26)				
40 CFR Parts 141.60 – 141.63 and 141.50 – 141.52	The National Primary Drinking Water Regulations establish MCLs and MCLGs for several common organic and inorganic contaminants for public drinking water systems. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentrations at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable, health-based goals set equal to or lower than MCLs.	Chemical-specific	Relevant and appropriate	These regulations apply to all public water supplies (having more than 15 connections or serving more than 25 persons regularly). The MCLs are relevant and appropriate for the site because the aquifer underlying the site currently is used for the public water treated and supplied by the Indiana American Water Company (IAWC). Currently, nothing prohibits the use of groundwater at the site as a public water supply.
40 C.F.R. § 144.12, excluding the reporting requirements in § 144.12(b) and 144.12(c)(1)	The UIC program prohibits injection activities that allow movement of contaminants into underground sources of drinking water that may result in violations of MCLs or adversely affect health. An approved UIC program is required in states listed under SDWA Section 1422. Class I wells and Class IV wells are the relevant classifications for CERCLA sites.	Action-specific	Relevant and appropriate	Injection wells for groundwater treatment may be Class V wells under the UIC program.

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
FLOODPLAIN MANAGEMENT EXECUTIVE ORDER 11988				
40 CFR Part 6, Appendix A	This order requires federal agencies to evaluate potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification or construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Location-specific	To be considered	Executive orders are TBCs, not ARARs. This order will constitute guidance for any construction activities in the Wabash River floodplain.
CLEAN WATER ACT OF 1977, as Amended, Section 404 (33 U.S.C. § § 1251-1387)				
33 U.S.C. § 1344 Permits for dredged or fill material	Federal agencies must minimize the destruction, loss, or degradation of wetlands and preserve and enhance natural and beneficial values of wetlands. Remediation required within wetland areas must minimize potential harm and action taken to restore natural and beneficial values of the wetland areas.	Location-specific	Applicable	The substantive statutory provisions are potentially applicable if discharge of dredged or fill material to the Wabash River floodplain is planned as part of the response action. No wetlands are currently known to exist along the southwest site boundary or the Wabash River.

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
CWA Section 402 (33 U.S.C. ch. 26, § 1342) and 40 C.F.R. § 122.44(k)(2) and (4).	Discharge to surface waters, including storm water: Owners and operators of construction activities must be in compliance with discharge standards, including substantive provisions of the general requirements for storm water plans and BMPs.	Action-specific	Applicable	The substantive provisions are potentially applicable for construction activities that have the potential to discharge pollutants to surface water. All direct dischargers must meet technology-based requirements including the best control technology and the best available technology economically achievable.
FISH AND WILDLIFE COORDINATION ACT (16 U.S.C. §§ 661–666c)				
16 USC, § 662	Actions that affect species or habitat require consultation with the U.S. Department of the Interior, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and state agencies as appropriate to ensure that the proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. Consultation with the responsible agency also is strongly recommended for on-site actions.	Location-specific	Applicable	The substantive provisions of this requirement may potentially be applicable if the selected remedial action involves diversion, channeling, or other activity that modifies a stream or other water body and affects fish or wildlife. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources.
RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA) (42 U.S.C., ch. 82, §§ 6901–6991[i])				
40 CFR 261.21, 261.22(a)(1), 261.23, 261.24(a)(1), and 261.100	Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Chemical-specific	Applicable	The substantive provisions of this requirement may be potentially applicable for determining whether waste generated on site is hazardous for the affected site media: waste, groundwater, surface water, and/or soil.

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
40 CFR 262.10(a), 262.11	Person who generates waste shall determine if that waste is a hazardous waste.	Action-specific	Applicable	The substantive provisions of this requirement may be potentially applicable for a remedial action where hazardous waste is generated such as the soil from excavation and offsite disposal. The determination of whether groundwater and/or wastes generated during remedial activities, such as soil cutting from well installation and treatment residues, are hazardous will be made at the time the wastes are generated.
40 CFR 262.34	Hazardous waste accumulation: On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers in accordance with 262.171–178 or in tanks, on drip pads, inside buildings, is labeled and dated, etc.	Action-specific	Applicable	The substantive provisions of this requirement may be potentially applicable for a remedial action where hazardous waste is generated and transported. The determination of whether wastes generated during response action activities, such as soil cuttings from well installation and treatment residues, are hazardous will be made at the time the wastes are generated.

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
40 C.F.R. § 264.554(d)(1)(i–ii) and (d)(2), (e), (f), (h), (i), (j), and (k). Staging piles.	Hazardous remediation waste temporarily stored in piles: Allows generators to accumulate solid remediation waste in a U.S. EPA-designated pile for storage only, up to 2 years, during remedial operations without triggering LDRs.	Action-specific	Applicable	The substantive provisions of this requirement may be potentially applicable for a remedial action where hazardous waste is stored in staging piles, such as excavated soil requiring off-site disposal. The determination of whether wastes generated during response action activities, such as soil cuttings from well installation and treatment residues, are hazardous will be made at the time the wastes are generated.
ENDANGERED SPECIES ACT(16 U.S.C. §§ 1531–1543)				
50 CFR Chapter 1, Subchapter B	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat.	Location-specific	Not an ARAR	No endangered species that would be affected by remedial actions are known to be present at the site.
NATIONAL HISTORIC PRESERVATION ACT OF 1966, as Amended (16 U.S.C. § 470–470x-6)				
36 C.F.R. Part 800, 40 C.F.R. § 6.301(b)	Historic project owned or controlled by federal agency: Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Location-specific	Applicable	No part of the site is listed on the National Register of Historic Places. This Act is potentially applicable during remedial activities if scientific, historic, or archaeological artifacts are identified during implementation of the remedy.

APPENDIX C

TABLE 1
FEDERAL POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Notes:

§	Section
§§	Sections
ARAR	Applicable or relevant and appropriate requirement
CFR	*Code of Federal Regulations*
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
IDEM	Indiana Department of Environmental Management
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly owned treatment works
PRG	Preliminary Remediation Goals
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
U.S.	United States
USC	*United States Code*
VOC	Volatile organic compound

APPENDIX C

TABLE 2
STATE POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Potential ARAR	Description	ARAR Type	Potentially Applicable or Relevant and Appropriate	Comment
INDIANA ADMINISTRATIVE CODE (IAC)				
Regulation of Water Well Drilling (IC 25-39-4 and 312 IAC 13)	This regulation outlines requirements for construction and abandonment of groundwater wells for non-personal use in Indiana.	Action-specific	Applicable	The substantive provisions of this requirement may be applicable if installation and abandonment of water wells (such as extraction and monitoring wells) is required.
Indiana Air Pollution Control Regulations (IAC Title 326)	This law applies to the regulation of air emissions for activities that could create fugitive dust.	Action-specific	Applicable	The substantive provisions of this requirement may be relevant and appropriate if remedial action activities (such as construction and excavation) create fugitive dust.
Indiana Regulations for Establishing Emissions Levels for VOCs (326 IAC 8)	Establishes permitting requirements for emissions of VOCs and requires Best Available Control Technology for new sources with potential emissions exceeding a specified threshold value.	Action-specific	Applicable	The substantive provisions of these requirements may potentially be applicable if a remedy is chosen that involves the release of VOCs from treatment equipment.
Indiana Regulations for Permitting of Air Strippers (326 IAC 8)	Establishes permitting requirements for emissions of VOCs and requires Best Available Control Technology for new sources with potential emissions exceeding a specified threshold value.	Action-specific	Applicable	The substantive provisions of these requirements may potentially be applicable if a remedy involving the use of air strippers to remove VOCs from groundwater is chosen.
Indiana Regulations for Construction Permits for Water Treatment Facilities (327 IAC 3)	The regulations control the issuance of permits for the construction of water pollution treatment or control facilities.	Action-specific	Applicable	The substantive provisions of this requirement may be potentially applicable for a remedial action where on-site groundwater treatment facilities are constructed.

APPENDIX C

TABLE 2
STATE POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
ELM STREET GROUNDWATER CONTAMINATION SITE

Notes:

ARAR	Applicable or relevant and appropriate requirement
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
IAC	*Indiana Administrative Code*
IC	*Indiana Code*
IDEM	Indiana Department of Environmental Management
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly owned treatment works
PRG	Preliminary Remediation Goals
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RSL	Regional Screening Level
U.S.	United States
USC	*United States Code*
VOC	Volatile organic compound